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The Programme of the Engineer and of the Architect.

THE main divisions of the professional study of the engineer as far as concerns, first, survey; secondly, public works proper; and thirdly, the application of these motor-powers which nature herself offers to the service of man. The point thus reached may, indeed, be considered as a sort of landmark. The discovery, by Watt, of a means of applying for the production of motion the expansive power of steam, forms an epoch in the history of engineering. The mechanical engineer is sometimes regarded as if he occupied a lower position in his profession than his civil brother. No view can be more inaccurate. The civil engineer must be, to attain any eminence, a mechanist and a workman also. Our first engineers have been mechanics. The minute details of the locomotive have received as much and as enlightened attention from Robert Stephenson and from Isambard Kingdom Brunel as they have done from Fairbairn, or from any exclusively mechanical man.

The use of steam-power, first for the drainage of mines, then for the general movement of machinery, and thirdly, for propulsion by movable engines, both by land and by sea, had attained a very important development before the theory of mechanical motor-power was at all properly understood. It is forty-five years since Ericcson, by his successful construction of a hot-air, or caloric, engine, gave a practical proof that the value of the vapour of water for mechanical purposes was due to its capacity for heat; and that heat itself was the source of motion. The determination of the thermal unit was a step of extreme importance in the advance of mechanical science, and the researches which are now being daily pressed further and further into the study of electricity, point to a possible improvement in our methods of applying the force of nature, as much in advance of our present mechanical knowledge as that is superior to the science of a hundred years since. It is true that the cost at which a certain quantity of heat can be produced by the combustion of coal is very far less than that attainable by any other known process of chemical decomposition or recomposition. That fact has been a barrier to the use of electro-motor machinery. But the discovery of the conversion of motion into the electric current, as in the case of the magneto-electric machines of Gramme, is one of which it is impossible to foresee the ultimate results. We can command, in the tidal movement of the sea, a source of motive power that is practically unlimited, as well as gratuitous. The main obstacle to the future application of this power to the service of civilised life is the difficulty of transmission. The present means of hydraulic and of pneumatic transmission of power are limited, costly, and clumsy, as compared to the use of the insulated wire for the transmission of the electric current. Up to the present time only currents of low tension have been required for telegraphic purposes. But the extraordinary results of the application of a steam-engine of only seven-horse power to the production of the electric light by the Gramme machine, on the one hand, and the discovery of the quadruple or multiple divisibility of the electric current on the other, seem to intimate that we are possibly on the threshold of brilliant discoveries, as to the means of availing ourselves of an unlimited source of motive power now very little employed or regarded.

It is thus, first to the production, and secondly to the transmission, of mechanical motor-power, that we hold that the chief attention of the engineer is invited by the actual state of scientific discovery. The study of the accumulator, and of all the appliances of hydraulic transmission of motion, is already assuming a practical importance hardly less than that of the study of the steam-engine itself, whether fixed, marine, locomotive; or movable, as in the case of agricultural steam-engines. As to the latter, the chief attention at the moment, especially on the Continent, is turned to the improvement of what are called secondary locomotives, which are required either for the ascent of steep inclined planes, or for the propulsion of vehicles or tramways at comparatively low speeds. It is probable that the advantages thus to be obtained are at present rather overrated than otherwise. The economy which is attainable for locomotion over an approximate level, and at a speed not less than twenty miles per hour, is so great, as compared with the former methods of transport, that a saving of four-fifths in the cost is estimated to have been obtained. But with the introduction of the counteracting power of gravity, in steep ascents, and with the reduction of speed, the great economical advantages tend to disappear. We may find a steam-engine cheaper than a pair of bullocks to take a given load up a given hill. But it will be the persons who have to ascend the hill who will have, as a rule, to provide and apply the engine-power. There will not be even that return for the expenditure of the capital of independent persons, who merely seek a profit for their money, that is afforded by our railways; and even that is now only 4·32 per cent.

After the general study of the engineer with regard to the apparatus for the production, and for the transmission, of mechanical motor-power, comes the wide field for his skill in the application of such power. Here we enter on mechanism proper;—industrial mechanism, the substitution of mechanical contrivances, exact in their operation, for human skill, which is less exact. The line may here be drawn with unusual precision between mechanism and art,—between the mechanic and the artist. It may not be too much to say that we anticipate that almost anything, for the production of which skill may be acquired as matter of routine, will sooner or later, be better, as well as more cheaply, effected by machinery than by human fingers. On the other hand, in all that into which the real soul and genius of the artist enters,—all that which no toil or labour will enable an unsympathetic scholar to acquire,—will remain the province of man as distinguished from machinery. In the vast factories now erected for the production of textile fabrics, the operatives are becoming, more and more, the mere attendants on the machines. The saving of labour is now being made in the direction of increasing the number of spindles, of looms, or of other machines, which can be tended by one man. But while a faultless and accurate piece of machine-made lace, for example, is turned out at an incredibly low price per superficial inch, the manufacture of this fabric does not lower the price of Rose Point or of Honiton. The individuality of the artist, even in so humble a matter as the execution of a delicate pattern in thread, can never be attained by the machine. When what is wanted are great numbers of indistinguishable copies, they will be produced, from year to year, cheaper (and it may be hoped better) by the mechanic. When what is required is to gratify the taste, or to elevate the tone, it will always remain the province of the artist.

It is, of course, far beyond our present limits to attempt to sketch an outline of the application of mechanical power. An instance which may be cited as one of the most extraordinary triumphs of this branch of mechanics, of recent times, is the sewing machine. While for many purposes the work done by this instrument is inferior to hand-work, there is no doubt that the burden of an enormous amount of purely mechanical oil is thus taken off mankind, or rather womankind. The only question is, how far the workwoman has been raised in the social scale by the invention. We very much fear that it is precisely where the heaviest burden formerly fell that it is least diminished, even if changed in the mode of its incidence, by the change. Amongst the most striking of the modern mechanical applications of scientific principles, of comparatively late discovery, may be named the bicycle; and the beautiful American drilling machine, in which one coil of flexible steel wire revolves within another, and the instrument while rapidly working may be applied in any direction. The more wide becomes our acquaintance with the field of

mechanical invention, the more profound will be our conviction that the engineer is, in this branch of his calling, but at the very commencement of an immeasurable progress.

Among those special mechanical industries which at the present moment demand so much of the attention of the engineer, may be mentioned the transmission of signals to a distance by electricity, whether they are designed to attract the eye or the ear; the application of the same power to purposes of illumination, whether by way of instant ignition and extinction of coal gas, or as a direct source of light; the labour-saving machinery of which the farmer is daily making more and more use, and the application of steam locomotive power to what are called secondary purposes,—that is to say, to the ascent of steep hills, or to the propulsion of vehicles through the streets of populous towns. In these matters, we see on the one hand the successful application of patient care, and even the flashes of brilliant genius. On the other hand, we have to lament the adoption of suggestions, any one of which may in itself be good, but which, taken together, are mutually exclusive. Such, for example, is to be found in a recent report on local railways, or, as we should call them, tramways, in France, in which the combination of gradient, engine-power, weight of rails, and possible weight of train, is so impracticably proportioned that no train could exceed a gross weight of 7½ tons, exclusive of the engine; while a rate of charge equal to that at present made for horse haulage by the common road would be insufficient to make any return on the capital expended. Here is a case in which the schoolmaster is signally abroad, and in which the need of sound scientific programme is abundantly illustrated.

When we turn from the rough programme of the study proper for the education of the engineer to that appropriate to the architect, we shall see that there is at the same time a close resemblance, and a sensible difference, in the points which it is needful to block out, as compared with those already indicated. As the study of the engineer commences with survey, so does that of the architect. But as the aim of the former is to work in accordance with mechanical law and routine, while that of the latter is to produce the work of the artist, so from the very commencement of their studies should a certain difference of bias be impressed on the respective pursuits of two students. We have regarded survey, as conducted by the engineer, as composed of two branches,—that of the making of maps, plans, and diagrams, and that of the inspection of materials and workmanship. This second branch is common to the two professions,—the differences, when they exist, being only those of detail. But while the work of the engineer, in the wider branch of science, is mathematical, that of the architect is artistic. Not that the importance of exact and actual measurement of details is to be undervalued. Not that the drawing-board, the T and set squares, the dividers, and the compasses, ought to be less familiar implements for the one pupil than for the other. Not even that we undervalue for the engineer the use of the sketch-book. But his sketch-book, if what it ought to be, will be something very different from that of the architect. A certain degree of proficiency in freehand drawing, desirable for every one, is indispensable for the student of architecture. Above all, he must be gifted with that power,—rare as it may be,—which enables a man to see a picture where it exists; in fact, to appreciate the pictorial in nature. The survey of the architect, in this sense, consists in the filling his mind with the noblest and best specimens of structural beauty and excellence. His memory, no less than his note-book, will be enriched, his taste will be formed, and his judgment enlightened by travel and observation. Not only will he have to view a building in the grand, to appreciate the proportions of its most striking features, and to apprehend the law of architectural subordination, but he will at the same time become aware how far climate and situation are elements of style. He will understand how Egyptian architects burrowed in the live rock for a grateful shade from the burning sun of Africa; how Greek and Italian architects were contented with the artificial shade of peristyle or of vault for the brief heat of the Mediterranean summer; how Teutonic architects throw up pointed and gabled roofs to throw off the burden of the winter snows. As the survey of the engineer gives him exact measurements of space, so the survey of the architect should give him truthful ideas as to situation, adaptation, and proportion.

Distinct from this preparatory schooling and enrichment of the mind is scientific knowledge of structure, both as to mathematical construction and as to strength of materials. Here the architect for the most part has to deal with problems of less magnitude than the engineer; and tables and examples will be readily forthcoming to guide his ordinary practice. But the higher and more scientific forms of structure; the groined arch, the flying buttress, the frozen cobwebs of such ceilings as those of King's College Chapel, Henry VII.'s Chapel, St. George's Chapel, with pendentives that seem to mock the unsleeping power of gravity; the heavy dome of a Michelangelo or of a Wren; must contain no secret hidden from his research. Perfect structural skill, founded on mathematical knowledge, is an essential part of the furniture of the mind of the architect.

Hand in hand with this structural skill must rank what, if we retain the original meaning of the Greek word, may be called the economical skill of the architect—his ability in the distribution of the house. This part of his qualification may be described as the education and organisation of common sense. It is the portion of education which is most usually and most cruelly neglected, not in one pursuit alone, but in the general up-bringing of the young men and boys of England. By the service of this faculty the architect learns, as if instinctively, to make the best of a given site, to proportion means to object, to subordinate parts to the whole, as a matter of distribution of space. All questions of sanitary provision here come in; not only as to drainage, ventilation, illumination, and removal of smoke, but as to due proportion of open area to building, of vestibule and staircase to rooms, of offices and stabling to residences. An architect possessed of this kind of ability will never run a line of street so as to cross a line of thoroughfare and cut off a main street ventilation, as we so often see done in some of the ever-growing suburbs of London. He would as soon make his drains run up hill (as in fact has been done with some of the main drainage of London). Nothing is more easy than to undervalue, or to neglect, this important part of the education of the architect. Nothing is more fatal to the use and the value of his advice.

To these, the mechanical, although far from being the self-moving parts of his art, has to be added yet another element,—the æsthetic. Taste, it is true, cannot be given to him who has it not; but it may be cultivated in him who has it, even if the portion with which he is naturally gifted be but meagre. And even taste may be aided by intelligent perception of structural fitness. For all those features of building which give the finest contrasts of light and shade there is a structural reason. The man who attempts to beautify a building by *appliqué* ornament, stuck on without reason arising from structure, produces only costly abominations. It requires a noble and a cultured taste to make structural lines assume the most pictorial forms, as is the case in so much of our pointed ecclesiastical work. But the man who is unaware of this primary principle of decoration is like one who builds sham ruins to decorate a newly-planted shrubbery. The lamp of truth can never be left unlighted by any one who aspires to the fame or the name of an architect, except at the cost of his reputation.

Brief and imperfect as the above sketch admittedly is, it may yet not be altogether without use. The traveller who is encumbered with parcels soon becomes aware of the comfort and advantage that he derives from a list of his *impedimenta*. He knows each package, no doubt, well enough. Yet if they are not numbered or catalogued he will often feel puzzled to tell which is missing in the hurry of a railway station. The value of order, even of the most simple and unartificial kind of order, is often incalculable. Were those who direct architectural education to set before themselves the task of blocking out the duties of the profession—of watching against the danger of directing any one, instead of giving attention in proper proportion to all—the buildings now going on all over the country would be of a higher stamp than is too often the case. It is no doubt true, when we look back to the work of architects of a former generation, that much ignorance and neglect of detail often characterise their work. We may see many a building which, viewed at a certain distance, is imposing from its just or even noble proportions, but which yet pains the educated eye, on a closer approach, by its rudeness or even vulgarity of detail. It is quite intelligible that as architects have become aware of this deficiency their efforts to obviate it may have led them to err in the opposite direction. In the careful study of the best details of the old masters the students have but too naturally lost what is more important than any detail, namely, grasp of the dominant idea. With men of real taste, and real desire to excel, it ought to be sufficient to give this hint. When the architect takes breath—steps back from his drawing-board, as the painter does from the easel,—asks himself, "What, after all, was the original motive of this moulding, or of that feature of detail?" he may often start to see how he is forgetting the whole in a too careful study of the parts. The essential value of an exhaustive programme may thus be held to be twofold, both to the architect and to the engineer. First, it should insure exhaustive study, by enumerating every branch of skill and learning proper to the profession. Secondly, it should insure, by the order of its own arrangement, a corresponding order in the mind of the student, and a fit subordination of parts to a complete and perfect whole.

THE CHICKENS LIGHTHOUSE.

THE word "seaside" has for many a prosaic and dull rather than an exciting and interesting meaning. The promenade, the sands, the monotonous lodging-house, or the overcrowded hotel,—these are the first thoughts suggested, we fear, to too many by these two monosyllables. But, as the late Canon Kingsley, Mr. Gosse, and others have conspicuously shown, the seaside teems with never-ending interests, and in its changing scenes the imagination may find the most opposing contrasts, as Wordsworth has well suggested in his fine lines on the picture of Peel Castle, Isle of Man, which was painted by his friend, Sir George Beaumont, for at one time the castle is all peace:—

> "I would have planted thee, thou hoary pile,
> Amid a world how different from this,
> Beside a sea that could not cease to smile
> On tranquil land beneath a sky of bliss."

At another it is seen in all the solemnity of an Atlantic storm:—

> "And this huge castle standing here sublime,
> I love to see the look with which it braves,
> Cased in the unfeeling armour of old time,
> The lightning, the fierce wind, and trampling waves."

It is a building not cased yet in "the unfeeling armour of old time," but with new and solid granite blocks, yet equally unharmed by "the trampling waves," which is the subject of our seaside study. The Isle of Man itself is a somewhat remote spot, and scarcely anywhere on it is it possible to lose sight of the sea. Its southern coast presents bold and lofty cliffs to the sea, and there may be seen here pieces of coast scenery quite equal in grandeur to those Cornish cliffs which we have so recently seen depicted by Mr. Brett's exact brush. Right at the end of this southern portion, and divided from the mainland by a sound some quarter of a mile in breadth, through which the tide rushes, except at the moments of high and low water, with the disturbance of a mill race, and with a hundred times its force, lies another island, the Calf of Man. Here live some rabbits and sheep, the inmates of a single farm, and the lighthouse-keepers' families; and lastly, a spot in the wastes of the ocean, three-quarters of a mile distant from the extreme end of the Calf is the Chickens Rock, and firmly built upon it is the Chickens Lighthouse. This rock had for many years been a danger to navigation, for it rose out of deep water, and was only visible at low tide. Moreover, the neighbouring coast is of a perilous character, with its strong currents and rock-bound cliffs, and many a good vessel has perished on the rocks of the Isle of Man. Accordingly it was determined to erect a lighthouse on this perilous rock, and in 1870 the work was begun by the contractor, Mr. Hunter, from the designs of Messrs. D. & T. Stevenson, the well-known marine engineers of Edinburgh. It was completed in 1873, but it was some time after that date before it was ready for actual use, so that it is only a few years ago that its light began to illumine the surrounding seas. It is true that previously there were two lighthouses on the Calf of Man, erected in the year 1818, whose light was visible for twenty-two miles; but it was found that from the considerable height of the

land above the sea level these lights were by no means the guide and protection which was desirable in so dangerous a spot. The material of the Chickens Lighthouse is Scotch granite, from the quarries of Dalbeattie; the blocks are large, and are dovetailed one into another, so as by their union to add firmness to their resistance to the sea. The structure was first of all built at Port St. Mary, each stone was then numbered, and was carried in a lighter to the rock, a distance of some five miles. But the difficulties of winds and tides made the actual distance more material than had these great blocks to be carried on a sea always quiet and smooth, though in this respect the work was not so arduous as that in connexion with the Skerryvore Lighthouse, on the western coast of Scotland, which is sixteen miles distant from the nearest land. When completed, the Chickens Lighthouse had cost 88,000*l.*, but it was a work which in the interests of commerce and humanity would have been cheap at double this sum.

It is not every day that it is possible to visit such an uncommon object of the sea-side as the Chickens Lighthouse, and it was with no little pleasure that we lately availed ourselves of an opportunity of visiting this important addition to the lighthouses of Great Britain. Nor is it every day that it is accessible, for the rapid tides which rush round the Isle of Man become when disturbed by only a moderate breeze difficult and even dangerous for boats, even when manned by men who have known each rock from their very boyhood, and the Chickens Rock itself, once the favourite resting-place of Mother Carey's Chickens, lies in the middle of a rapid rush of the tide, which often makes landing an impossibility, and at the best of times it is only within two hours of low water that it is possible to disembark on the rock. Thus, during the storms of winter the rock is often inaccessible for three or four weeks together, and the lighthouse-keepers live as much cut off from their homes as though they were imprisoned in a distant island in some far-off ocean.

But it was a sunny and tranquil August morning when we set off from the fishing village of Port St. Mary in the official boat which every fortnight, if possible, conveys provisions to the rock. We say official boat, because the Chickens Lighthouse is under the jurisdiction of the Commissioners of Northern Lights, and is thus regarded, from the point of view of the lighthouses of Great Britain, a Scotch light. We had a cargo of loaves and beef, many casks of water, and some of ale, and four men to pull our craft if the wind were unfavourable for sailing. As we went along beneath the lofty cliffs of Spanish Head, and passed the fleet of herring-boats in the calm morning working their way to sea, a more picturesque aspect of the ocean could not have been desired. In about an hour we put into a rocky cove called the South Harbour, near the end of the Calf, whose surface presented a rich expanse of colour where the hillocks of purple heather were united to thick, low bushes of the dwarf yellow gorse. Here we landed a visitor to the lighthouse-keepers' families, and took on board the light-house-keeper whose fortnight off duty had expired; for there are three regular keepers, and a fourth who is a sort of supernumerary, and each of these men has to serve on the rock for six weeks, and then he has a fortnight on shore. Rounding the cliffs which form the extreme south-western point of the Calf, an isolated mass of rock undermined by the sea, and which is locally known as the Burrow, the tide was rushing by the rocks like the current of a great river, and the sea around was a mass of irregular and tossing waves. Passing these, we reached the rock where the tide was running past with a strong but a more tranquil current. The knowledge of the boatmen enabled us to make fast in the little curve which forms the species of rock harbour, but the tide was then too high to land, and for a while the time was passed in landing provisions with a swing rope. For some time after the landing had been effected, we amused ourselves till the putting ashore of spars and embarkation of empty casks and chests was completed by the sport of fishing for what in those parts are termed blocken (*Anglicè*, coal fish,—*Merlangus carbonarius*), which at this season of the year appear where the tide is rapid in great shoals. They agitate the surface of the water, which appears alive with the heads and tails of fish, and at such times seize greedily on an artificial fly. They looked in the clear deep water which lapped the rock like a mass of mad fish, as they, various in size, dashed over and around each other. The sea presented a cheerful sight: there were some sixty of the herring fleet, with their sober brown sails, some working by the cliffs, others barely visible in the horizon, and here the smoke of a steamer was seen, and there the white sails of a trader going down Channel, and rising above was the graceful gray pile of granite so smooth and yet so strong, and the men cheerfully working at their stores, and around

"No motion but the moving tide, a breeze,"

that it was not easy to conceive this scene in its other aspect,—the rock deserted, the openings to the lighthouse closed, the waves swirling round the impervious pile, and, to quote again from the same admirable poem of Wordsworth:

"This sea in anger, and that dismal shore."

What, by way of courtesy, may be termed the door, was reached by an iron ladder fixed to the wall, about 40 ft. in height from the base of the lighthouse, which we may observe *en passant* is 142 ft. in height, being the highest yet constructed, and 42 ft. in diameter at the rock, whilst the thickness of the wall at the entrance door is 9 ft., and at the height of 90 ft. it is reduced to 2 ft. 11 in. Up to what may be termed the basement floor the structure is a solid mass of stone, and afterwards it rises until it is terminated by a bell-shaped summit, the centre of which is one immense piece of granite dovetailed into the surrounding stones, and which forms the middle of the floor of one of the topmost compartments or chambers.

What we have termed the basement floor, or, more properly speaking, the lowest chamber, is wholly occupied by the coal-bin and the water-cistern. The second compartment is entirely filled by the oil-tank. Then comes the store-room, then the kitchen, then the workshop and library, then two chambers, each occupied by sleeping-berths one above another, and then there was the machinery-room, and finally, fixed on an iron stage, was the dioptric revolving light apparatus, the lamp being surrounded by very powerful magnifying lenses more than 6 ft. in height, whilst outside it was encircled by a gallery or iron stage, and the whole being enclosed in what may best be described as a glass house, which forms the top of the lighthouse. The two bells which, when the sea is overhung by fog, sound every half-minute their melancholy note, are placed on a gallery running round and outside the machinery-room. The lenses are fixed in a frame which revolves slowly, so that the light is exhibited at fixed intervals, and the same machinery serves to toll the bells when necessary. The machinery is of the same description as that which works a clock, and requires to be wound up every hour, as the rope runs down in that period of time. As a man has to be on the watch for a fog, and to see that the light is burning brightly throughout the night, the short time which the machinery runs is probably no actual drawback. But there can, we think, be no doubt that it would be better if the machinery did not need attending to so frequently, for in some lighthouses there might be fewer men and more duties, and many things might happen which the short time of the running of the rope might seriously affect. It is not out of the range of probability that the keeper on duty might be taken suddenly ill, and that in consequence the frame might cease to revolve from want of being wound up at the proper time. But Messrs. Stevenson have added so much to the value of the dioptric plan, and are so skilled in their profession, that the time may come when they will improve this portion of the lighthouse apparatus.

As regards the other portions and arrangements of the building, it would be difficult to imagine a more cosy abode under the circumstances. The men are all supplied with books by means of a circulating library, of which the several lighthouses under the authority of the Commissioners of Northern Lights are the members, and each work, after a circulation from rock to rock, finally finds itself made a permanent addition to the library of some one of the lighthouses. The lot of men in a lighthouse on a submerged rock such as the Chickens or the Skerryvore, is of course much more desolate than that of those on the point of some portion of the mainland, and it is somewhat a matter of surprise that means do not exist for housing a boat and moving it to or from the water. It is true that it is seldom that it would be possible at the Chickens Rock to manage a small boat with only a couple of hands, but there are lighthouses being erected on other rocks in other seas, where such an apparatus would be available, and there might be a time when such a boat might be the means of saving human life.

Again, it is becoming an interesting question in regard to lighthouses, but one which we have not space to discuss at length in this paper, whether oil should not be superseded by electricity or gas. The two objects to be aimed at are, cheapness in the cost of the illuminating material and powerfulness to give light, and there can be no doubt that gas has the supremacy over oil in this last point. But here again, a lighthouse on a rock in the sea and one on the land differs, especially as regards their capabilities of being supplied with coal. There is a lighthouse shortly to be erected on Langness Point, in the Isle of Man, the ground for which has already been surveyed, and it is possible that some changes as respects the above points may be introduced into it. But at the same time the Chickens Lighthouse presents the latest and most admirable specimen of the lighthouse fixed on an isolated rock in the midst of the ocean, and when we consider how much work in the erection of lighthouses there is to be done in the British Colonies, and on the coasts of many countries, it would be difficult to point to an example more worthy of imitation. For no work could be a greater success, both as regards the manner in which its construction was carried out, and its actual structure, considering the purposes for which it is intended, than the Chickens Lighthouse.

When the survey was completed, and our boat was laden with its cargo, and the keeper whose fortnight of leisure had arrived was on board, we left the rock to its four inhabitants, and in an hour or two the low beams of the western sun were glittering on the rising tide, and there was nothing visible but the silent gray pillar encircled by the waste of waters, the lessening sails of the fishing-boats, and the cormorants flying low over the evening sea.

RAILWAY COLLISIONS AND THEIR PREVENTION.

ONE comfort may be drawn, by way of assurance as to the future, from the disastrous collision at Sittingbourne on August 31, followed as it was by a no less alarming, though happily a less disastrous, error at Princes Risborough within six hours; and, indeed, by nearly daily misfortune since. We need not refer to the comparative immunity enjoyed by the railway traveller from such wholesale slaughter as that of which the Thames has just been the scene. The thirty-six passengers, and twenty-eight railway servants, killed from causes beyond their own control on the railways of the United Kingdom in 1876 bear but a small proportion to the terrible sum total drowned off Woolwich. Even if we add the 1,481 cases of reported injury, many of which may have been comparatively slight, we shall find that the proportion is but one injury to every 430,000 passengers. But statistical comfort is but poor consolation. Relative safety, no doubt, is a matter important to study. But what the traveller demands is absolute safety, so far as it is within the range of human forethought and human care to insure it. As to that, then, we can speak with some certitude. The means which have been invented, and to a great extented adopted, for the prevention of such collisions as those in question, have never yet been known to fail. Where these catastrophes have occurred has been precisely where these means have not been applied. We refer, of course, to the system of interlocking points and signals. The interlocking system, and the block system, though usually combined, are, as our mechanical readers are aware, entirely different things. It so happens that, on the English railways, to the end of 1876, the proportions of signals and points interlocked, and of lines worked on the block system, were the same, viz., 69 per cent. But in Ireland, at the same time, 25 per cent. of the points and signals were interlocked, and only 2 per cent. of the passenger railways are worked on the block system. It is of the mechanical arrangement that we now speak,—that rigid connexion of the points and the signals which automatically show when the line is foul. The whole of the London, Chatham, and Dover line is worked on the block system. But only 57 per cent. of its points and crossings were, at the date of the last accessible returns,

interlocked. Here, then, lay, we do not say the cause, but the reason of the absence of prevention, of the collision of the 31st ult. We observe that the experience of Lieut.-Colonel Rich has enabled him to call the attention of the jury to the subject. The railway company have also shown that they appreciate its importance, as the application of an interlocking apparatus to this very station had been resolved on by the directors.

It is certain that what has hitherto proved a very fertile cause of railway catastrophes may be prevented; and has, to the extent of 57 per cent. on one English railway been obviated, by the interlocking of points and signals. It is not, of course, to be pretended that absolute safety is ensured to the traveller by their universal adoption. The case of the rupture of a tyre, for example,—happily becoming extremely rare,—is thus not to be met. But it is an undeniable fact that collisions, as a rule, are rendered all but mechanically impossible by a contrivance that shows the driver of an engine, at an adequate distance, the actual state of any switch that he is approaching. It is, there can be no doubt, to the interest of the railway companies themselves that the system should be made imperative. The chairman of one of the oldest and best-managed railways in the kingdom said the other day, at the half-yearly meeting, that the expense of 14,000*l.* to which his company had lately gone in providing this kind of fitting would save them 1,000*l.* per annum in wages. When we come to the money cost of an accident (independent of the graver cost in life, limb, and human suffering), it is plain that that would be a beneficent compulsion that should improve the application of the interlocking system to any railway point that could in any way affect the safety of the passengers. London, Chatham, and Dover stock fell 2 per cent. on the announcement of the accident.

Under ordinary circumstances, we might look with confidence to the Government to introduce a Bill to render imperative the interlocking of points at the very commencement of the next session of Parliament. But it must not be forgotten that there is, already, a certain tension existing between the Board of Trade and the railway companies. The attempts made by the former, on more than one occasion, to obtain information that would throw light on the value of the mineral traffic have remained to this hour without any result, so far as the public are aware. Nor must the weight of the railway interest in Parliament be overlooked; or the high probability that that interest will resist to its utmost any compulsory measures, however much they may be to the advantage of the companies, as well as of the public.

We, therefore, express the hope that some independent member of Parliament will take the matter in hand, and ensure to himself that degree of public gratitude which should always attach to the prevention of preventible mischief to human life and limb. It would be difficult to oppose the proposal that, after a certain date, the use of non-interlocked points and signals, on a passenger line, should be an offence punishable by a definite fine per day. Arguments could not fail to the proposers and the supporters of such a Bill. The Board of Trade could hardly hesitate to throw the weight of their recommendation in its favour. The public would receive the proposal with acclaim. The companies would be the richer for its enactment. Who will be the patriotic member who, amid the cool breezes of Scotland or of Norway, will devote a portion of the leisure of the recess to the drafting of a short Bill to the following effect?—

"Whereas it is ascertained that collisions on railways arising from the mis-direction of trains may be for the most part prevented by the interlocking of points and signals, Be it enacted that from and after the *first day of January*, 1880, any railway company that shall have or use any point or switch connected with a line used for passenger traffic which is not interlocked with a proper signal, shall be guilty of an offence against this Act, and shall forfeit the sum of *Five Pounds* for every day during which such switch shall remain in position without such interlocking. The penalty to be recoverable summarily before a magistrate, and to be devoted, half to the informer, and half to the funds of the nearest hospital."

A brief measure like this would add an honourable repute to its proposer, and form a great safeguard to the travelling public.

DOUGLAS, ISLE OF MAN.

A SMALL island naturally is the last place usually affected by the improvements of modern times, and though the town of Douglas is becoming rapidly modernised, the other three towns of the Isle of Man still retain much of the quietness and the simplicity of which their characteristic feature.

Ten years have made great changes in the town of Douglas, but, whilst naturally improved by the various alterations which have from time to time taken place, it is quickly losing the quaintness which was one of its chief attractions in the eyes of the stranger. It is possible to find promenades and showy hotels in dozens of English towns, but it is not so easy to find a town which possessed the picturesque and quiet attributes of Douglas a few years ago. It was nestled in the southern corner of the bay, where the Douglas stream joins the sea beneath the precipitous head, with its houses rising on the slopes of the hill, whilst a fine bay two miles wide swept round to the north till it was closed in by the rocks of Bank's Howe. The situation of Douglas is, in fact, remarkably fine, for the two cliffs by which the bay is guarded, its graceful form, and the sloping background ended by the chain of hills from which Snaefell rears itself, with a foreground of unbounded sea, make a noticeable feature.

The town itself was ugly taken piece by piece; it presented no single admirable architectural feature, and its narrow, ill-paved streets, its ship-lined quay, were not in themselves actual objects of admiration. But it was the town taken as a whole which was attractive, there was a quaintness and a quiet dulness over it all which carried the sightseer back to less bustling times and habits than those with which we are now acquainted. But this is all being changed, and though the actual piece of harbour at the mouth of the Douglas about which the blue jerseyed seamen stroll, and which the low houses and small shops of the quay face, still preserves something of the past, the town itself is rapidly being transformed into the semi-fashionable watering-place with all the usual modern characteristics. This, as we have said, is not to be wondered at; from the point of view of the inhabitant and of the sea-bathing tourist the change is desirable; but those who like from time to time to light upon spots where a not dull monotony prevails suitable to the surrounding scenes, will regret the transformation of the little seaport into the "salubrious watering-place" of the nineteenth century. But the natural attractions of Douglas are so considerable that it is of interest to note how they have been utilised by the architect.

For a great many years a road has run along the edge of the bay from the northern end of the town, properly so-called, until it reached the curve where the northern headland commenced, where it ascended and crossed the hill. This road, running almost on a level with the shore, has had above it detached houses and gardens. But when the town itself was noticed, it was to be observed that the main street, or rather lane, ran at some little distance from the bay, through the centre of the lower part of the town; and backs of small houses presented themselves to the sea from the old pier, completed in the year 1800, which forms one side of the extreme seaward end of the harbour, to the spot where the main street debouched into the open and formed the road of which we have spoken. The Town Commissioners and their architect have, we are glad to say, actually taken notice of the remarkable advantages presented by this sweeping bay, advantages which few if any of the watering-places present. Contrast the monotonous stretch of Hastings and St. Leonard's, the dreary plain of sand on which that northern favourite, Southport, is placed, and others which could easily be called to mind, and it is obvious that the improver of Douglas has a long natural start. Beginning from the base of the new Victoria Pier, which runs out parallel with, but considerably beyond the old pier, the houses have been demolished, an embankment formed, on which a broad roadway and footway have been constructed, and the entire bay is, with the exception of the rocky headland at the north, lined by a road which bends with the curve of the bay. The idea is simple, it is not an improvement on, but merely a recognition of, nature's own work, and is naturally, therefore, quite successful. It is now only requisite that the structures which are to face the sea should be built on a clear principle,—they should be simple and substantial, not breaking the fine natural lines of the place, but harmonising with the breadth and simplicity of the general scene. At present, however, the prospects of such a consummation do not seem bright. The houses already built are stuccoed brick buildings, which are dreary to the beholder, and want both the appearance as well as the characteristics of solidity. For the Victoria Pier, stretching out so as to lengthen the harbour, is a bold and solid structure, and the breakwater, whose concrete blocks slowly but gradually emerge from Douglas Head, so as to protect the harbour from the easterly gales to which it is exposed, is of the same character. Moreover, the chief building of Douglas is an excellent example to be followed. In the centre of the bay, backed by trees, rises what is now called the Castle Mona Hotel. It was, however, constructed by the late Duke of Athol, then the ruler and proprietor of the island, as his residence, and one may say Royal palace, for here he held a miniature court. It cost nearly 40,000*l.*, and is constructed of white freestone, from the Isle of Arran, to which time has given a mellow grey tone. From the centre rises a circular embattled tower. The main portion is absolutely square, with a wing on the south side, attached to which is a handsome portico. Here we have a building solid and simple, whereas when we come to the next large building of the town, the Peveril Hotel, which has been erected some eighteen months, and faces the open "place" which forms the root, so to say, of the new pier, we find a large, square, dirty white stuccoed building, simple even to ugliness, and looking,—compared to the Castle Mona,—both commonplace and weak.

Joint-stock companies, whose main aims are high dividends, cannot perhaps be expected to regard either beauty or durability, but when we contrast this building with the fine and simple front of the London and North-Western Hotel at Liverpool, the solid and homely white brick front of the Adelphi Hotel, which the proprietors have recently added, much to the improvement of the great northern seaport (both built by companies), and many other similar buildings, a feeling of regret arises that the almost unique site presented by the shores of the Bay of Douglas should not be graced by architecture worthy of the natural opportunities. But as is the beginning so is likely to be the end of the new buildings in Douglas, and we may expect the architect to behold them and be thoughtful when he notices how, as soon as men were left to their own devices and were unaided by the gifts of nature, their works were poor and ugly. For there can be no doubt that with the roadway round the bay graced with solid structures, and the chief streets of the town gradually built so as to run at right angles to it, so as to give views of the bay at one end, and of the inland hills at the other, with the heights outside the town, sprinkled by the white houses, the town of Douglas would be a worthy object of pride to the inhabitants of the Isle of Man. For it is certain that where nature, so to speak, has laid out the plans, the builder should so far as possible harmonise his designs with hers; when the town-maker of to-day has an absolute *tabula rasa* before him, as is the case in many seaside towns, there he must rest wholly on his own resources. The beauty of the Bay of Douglas must be acknowledged by the most careful seeker after the picturesque; its small harbour and squalid town used to recall to the stranger the times and manners, the smuggling and the semi-independence, of a past age. The possible improvements of to-day should have added to the charms of nature the grace and brightness of civilisation, but when one gazes on the stuccoed houses which are beginning to spoil the new embankment, and the crowds of rough and vulgar "trippers," whom the inhabitants regard as their best customers, one is inclined to think, in regard to them at least, of the old and not very complimentary Scotch rhyme:—

> "When Sathane tried his arts in vaine,
> Ye worship of ye Lord to gain,
> Ye yird, he said, and all be thine,
> Except ane place, it maun be mine.
> Though bare it is, and scarce a span,
> By mortals called ye Isle of Man.
> That is a place I cannot spare,
> For all my choicest friends are there." *

* "Irvine's Historiæ Scoticæ Nomenclatura," Edin. Edit. 1682.

THE PAST AND THE FUTURE OF ART-LABOUR.

IT would be hard indeed to find a subject matter of more immediate interest in the whole range of art than that of "art-labour," as it is at times termed, though the term be somewhat misleading. It would be equally difficult to find it treated in a more delightful and attractive way than it was by Mr. Gladstone at the distribution of prizes at the Hawarden Flower-show. Art-labour, or art-work, in the antique times, was not as what is termed "labour" now is, nor was it "work," as now understood by workmen. It then meant the work of the brain and the hand together in the same individual,—artist and workman. The subject, therefore, though so old, is new,—so new indeed that a detailed definition is all but necessary to make its real meaning and import clear. No art question can be more important than this, for in it is involved the main difference between the past and the present, as far as art and fine art are concerned. How far off the "future, in our present sense of the word, may be, is indeed a question.

It must be needless to say for how long a time we have urged on the attention of those most interested in it, and on the outer world, the importance of this great subject. So new in its details nowadays, but as old as the very hills themselves, if we but look a little out of the present, and into the past. We say as old as the hills, and we may well affirm this literally, for the art and handcraft of the workman of even that so far-off time have been, and are, found buried deeply in the very substance of the hills themselves, as at Troy, and places round about. So that of the *antiquity* of this art hand-work, and of the fact of the then actual presence and living action of the *workman as an artist*, however rude the character of the work he has left us, there can be no doubt. Indeed, we might go far beyond this even, and make note of the art-workman's power of eye and hand, coming from dates far beyond all written or even traditional records. But enough for our purpose is it to note the precise action of the art-workman of the simply "antique" days;—the Etruscan and Greek workmen, and their "skill of hand," and of which we may readily, in the British Museum, see so many proofs, though they be but a small fraction of what they actually did.

But Mr. Gladstone has touched as well upon a very momentous item indeed of this great subject,—at one time so all important; and it is that of the tendency of the time that now is to neglect this power of hand, and to pass it by if possible, and to devote attention to what are called "intellectual pursuits," and to look down with a certain amount of contempt on manual work, or work done with the hand. Indeed, might we not almost say that the whole tendency of things nowadays, and in this special generation, is to avoid it, and to hasten the time when this hand-work and manual power shall give way to the all-powerful machine, the workman then simply looking on, and seeing that all goes on as it should do, and without pause or mishap. And, as all know, in not a few "trades" the machine has entirely triumphed, and the "human machine" has simply disappeared! the proud boast of very many, indeed, being that this "division of labour" and power of machinery are competent to all things, and must needs eventually prevail. This was Cobden's idea, and he admitted once on a time to us that he had never considered the modern giant-power of machinery and the mighty potency of the "division of labour" from a "fine-art point of view" at all! It is, however, really so obvious a thought this that we might almost ask pardon for naming it here; but though so obvious it is but very rarely made note of. We might refer to the momentous fact that all the great art of the world, no matter where it is, has been the result of the very hand of the artist as well as his head; and that had the great artist-workmen of past days deputed other hands to do the work which they did themselves with their own, we should never have seen, to wonder at, what we now do. All would have been, as such work now is, mechanical and machine-like in structure; all its details would have been alike, and one side the mere repetition of the other. Not that this principle of mechanical copyism is quite new: far from it, it was often thought of, and sometimes attempted; and there are even,—and we could point them out,—examples of it. One sufficiently famous instance of at least a trial of this easy system of art-work was, in Michelangelo's attempt to get assistance in the painting of his world-famous ceiling. It is odd, indeed, that he should have thought for a single moment of it; for, if ever there lived an artist endowed with exceptional and all but superhuman powers of his own, it was himself, with his all-wonderful individuality! How, then, could he be helped to paint any more than to invent?

There is a very noteworthy remark, too, in Mr. Gladstone's address which might well furnish matter for many pages of comment on it. We refer to the complaint that there is a great deficiency of "art hand-labour," especially in this country. We are urged to go into the study of any sculptor in London, and it will be found that the sculptor, probably an Englishman, is obliged to have many assistants, for much work on the marble is required before the final finish comes, needing the actual hand of the artist himself. But these men even are not of English race, but foreign, Italians and French mostly. And why is this, may we ask? Why should our native artists be thus driven from the field? It cannot be said that there are not enough of them: witness only the number of Academy student sculptors, of whom we might say much, and much too, and more, on the system of teaching them in vogue. But in numbers certainly they are not deficient, nor, as we take it, in power or capacity, if only they be not asked to do work beyond their nationality, if the expression may be allowed. A vast field is here, indeed, opened out for improved methods, and it is melancholy indeed to be cognisant of the fact of the loss which art, and certainly architecture, suffers by the present, to say the least, imperfect system.

Again, needlework is mentioned, and attention is called to *embroidery*, which, it is contended, rises into a high art as it grows and advances. Needlework is now, as all know, the worst paid of all labour; but once raise it, Mr. Gladstone says, to a high-art standard, and it must needs become very well paid. A painful subject this almost, when we come to think for a moment of the magnificent sculpture which has but copied and perpetuated in enduring marble the thought and skill of those who thought out and designed, and then worked with needle and silk: the work of artist needlewomen,—of barbaric times even,—surely of Gothic days, and of the days of the magnificence of Venice. It is really grievous to think for a moment of how much of ever-living art and ever-visible art is lost to the world by the neglect of this most beautiful and graceful art, and by those who might, if they would, do so much with it. It was not, be it remembered, the imaginative power only of the sculptors and painters of the great past that urged them to their best work, and inspired them; but it was, after all, as in Venice, the constant presence before them of a noble fine art, in actual and living action, in costume, and all else, and of which this very needlework and embroidery are but exemplars. We see in it what can be done and what may again some day be done when the conditions of things and surrounding influences foster and duly encourage it.

How many lessons, therefore, are suggested to us, and to be drawn from this address, thus calling attention to what there is yet to do, and to the boundless field before the artist-workman of the future. We here can but touch on so wide and full a subject, and can but hope for a future fuller than the present of that which made the past so notable and enduring. In the main it was, there can be no doubt, the simplicity of the means employed, and we had almost said the directness and fidelity of the copying power. The magnificence and attractiveness of the old Venetian senator's robe of office, or that of the Doge himself, was not to be made more attractive, or eye and mind filling, by even the skill and genius of the best of the great painters of Venice. He painted but the material and the forms before him on more or less enduring canvas, not destined, happily, to so speedy a wearing out and destruction as the robes themselves, costly as they were, but destined to transmit to a distant future the memory of them in form and colour, and to picture to us those who wore them. But the art originally was that of those who thought about and worked at the material itself; and surely, as Mr. Gladstone remarks, it would be hard to say to what the following out of such a mode of doing art-work or labour might not in the future lead, or how profitable indeed it might not be made to be.

THE LATE MR. DAVID COUSIN, ARCHITECT.

INTIMATION has been received from Sans Souci, Louisiana, in the United States of America, of the death of Mr. David Cousin, on the 14th ult. Mr. Cousin, until about two years ago, held the office of city architect of Edinburgh, and also carried on an extensive private practice.

For several years past Mr. Cousin has suffered from heart disease and neuralgia, and to obtain relief has been in the habit of spending the winters at Mentone, Algiers, and similar resorts of invalids. Latterly he gave up practice entirely, and went to the United States, where he expected to find a climate suitable to his constitution; but the extreme heat of the past season proved too much for his strength, and reduced him to a state of prostration, from which he never recovered.

Mr. Cousin was in his sixty-ninth year, and has left a widow (his second wife), but no surviving issue. His father was a joiner in Leith, and with him he acquired the practical knowledge which afterwards proved most useful to him. In the early part of his career he exhibited a predilection for mathematics, and when still under age he entered the office of the late Mr. Playfair, then *facile princeps* architect in Edinburgh. When in the service of Mr. Playfair he assisted in the preparation of the plans for Donaldson's Hospital, the largest of Playfair's works, and also in the designs for the National Gallery, about the latest work by that architect. The influence of Playfair can be traced in the works undertaken by Mr. Cousin in his after-career. His happiest efforts are Classical in style; and when he did design after the Gothic manner, his bias was towards its later developments, as practised by his master.

When Mr. Cousin had attained the age of twenty-two years, he ventured to set up as an architect on his own account, and, like some other young architects, he owed his successful career in a great measure to his having been first in a competition. The competition in question was for the West Church at Greenock, and he was also the successful competitor in a competition for the parish church at Cambuslang. From these beginnings he came into some practice as a church architect, and soon afterwards received commissions to design Kingston Church, Glasgow; Olrig parish church, and Caithness Church, in all of which he showed his predilection for Classical models.

Mr. Cousin took a keen interest in the controversy which resulted in "the Disruption," and the formation of the Free Church, taking part with the Dissenters. The emergency called for the erection of numerous new churches. A scheme was concocted having equality and fraternity as its basis. All the new churches, although differing in size, were to be similar in style and unpretentious in appearance, and Mr. Cousin was appointed by the Free Church to furnish a series of suitable plans for churches on the cheapest possible model. This he did, showing how churches could be built at 16s. per sitting. In the emergency this was hailed as a masterpiece of ingenuity, and numerous churches were erected according to the published plans. Very few indeed of the original structures remain, for the Free Church, having succeeded far beyond the most sanguine expectations, abandoned the original ideas of primitive simplicity, and has since become very ambitious in the matter of church accommodation and adornment. One of the first of the original Free Churches abandoned by the congregation was Free St. George's, Edinburgh, and Mr. Cousin was appointed architect for the new edifice, which he designed in the Norman style. This church was erected in Lothian-road, and was afterwards taken down to make way for the extension of the Caledonian Railway Station, and re-erected at Stockbridge, having a tower added to it which did not form part of the original design. Another church, St. Thomas's, Rutland-place, was also designed by Mr. Cousin in the Norman style. The style as treated by Mr. Cousin does not exhibit the muscularity of the ancient examples, his classical training leading him to impart to it a degree of refinement which it will hardly bear if the original characteristics are adhered to. Mr. Cousin was requested by the Free Church

antharities to furnish designs for their new college in Edinburgh, but Mr. Playfair was ultimately chosen as architect for the building, which now forms a conspicuous object in the city.

Of the other designs in Edinburgh by Mr. Cousin we note the Corn Exchange, Italian in style, and the slaughter-houses with Egyptian façade. In the planning of this latter building Mr. Cousin bestowed great pains, visiting similar structures in Paris and elsewhere on the Continent that he might gain instruction; and the completed buildings fulfil the requirements so well that they have formed the model for other similar structures. The Corn Exchanges at Dalkeith and Kelso are also the work of Mr. Cousin, and in them he has adopted the latest or Tudor style.

Amongst the other buildings designed by Mr. Cousin are the parish church of Roseneath, Oban Free Church, the Combination Asylum at Lochgilphead; St. Catherine's Convent, Lauriston Gardens, Edinburgh; University Musical Class-rooms, Edinburgh; and a large and conspicuous circular mausoleum (Norman in style) in the Necropolis of Glasgow.

Mr. Cousin was also employed in renovating (not restoring) old Greyfriars Church, Edinburgh, and the nave of St. Giles's Church, which is used as a separate church. He was successful as a landscape-gardener, having laid out the grounds of the East Princes-street gardens, and the Warriston, Dean, and Newington cemeteries, Edinburgh.

Mr. Cousin, in combination with Mr. Lessels, carried out the plans for the City Improvement Trusts of Edinburgh, and one of his most successful efforts is the elevation for the finest street embraced in the scheme,—Chambers-street; but unfortunately, the requirements of those who have taken building sites in the line of the street have necessitated the abandonment in part of the original design, which was conceived in a manner combining utility of style with variety of treatment.

Mr. Cousin, from his official position, was to some extent precluded from taking an active part in political and other public questions, but in everything bearing upon the art which he practised he took a lively interest. He was one of the originators of the Scottish Architectural Institute,—an association from which he looked for happy results; but these, from causes which it is unnecessary to state, did not follow, and the Institute is a thing of the past.

AN IDLER IN PARIS AND ITS SHOW.

AFTER thoroughly studying and enjoying the exhibit which belongs to Messrs. Duplau and G. Hamot, of the Rue Richelieu, we pass on and spend a short time at Messrs. Braquenié & Co.'s, of the Rue Vivienne. Some of the tapestry subjects are taken from originals in the Louvre. The well-known picture of Charles I., by Vandyke, has been reproduced in that fine work. He is standing with one hand resting on his hips. In the back-ground, which is a landscape, a retainer is holding his horse. This picture, for such it deserves really to be called, has been purchased by Mr. Isaac Pereira. "The Harem," after Van Loo, is also a remarkable piece of colouring, as well as the "Doge's Palace," an Italian scene after Genty.

Braquenié, of Malines, has also contributed some fine specimens, notably two destined for the "Guildhall" of Brussels. One is "Le Serment des Escrimeurs" and "Le Grand Serment de l'Arbalète."

Beauvais gives us subjects from fables such as "The lion become old," "The wolf turned shepherd," &c. The tapisserie-savonnerie, manufactured at Belleville, the most Republican part of Paris, is not to be passed over, as it inaugurates a new style. The pile is raised, and has a soft, velvety look. The principal subject in their collection is a landscape.

I thought, before giving myself up to a happy hour in Austria, I would glance at the very magnificent glass exhibit of Bacarat. As I before observed, the grant of 20,000 francs per annum enables this manufacturer to offer objects of art to the public entirely out of the reach of private manufacturers. Of course the most striking object (however little it may be in accordance with the taste of many) is a temple to Mercury in solid glass. "It has an open cupola of flying spandrels, each a solid curved beam supported by massive, though light and graceful, columns. Mercury in a flying attitude is poised,—caduceus in hand,—on a rocky eminence. This figure and its pedestal are in bronze, frosted to resemble silver. The whole architectural portion of this temple is of crystal, translucent as water. A balustrade in glass also surrounds it, and on its edge at given distances rest crystal urns full of flowers. There is also an inner ledge inside the balustrade to make a parterre of flowers of. The cost of this temple is estimated at 4,000*l*. The remainder of the glass exhibit is very fine. The cutting, the engraving, the enamelling, are brought to a pitch of perfection that only our own remarkable show can vie with. There is in Bacarat a dessert-service consisting only of eleven pieces, and valued at 800*l*. Two vases of blue crystal enamel, with garlands of Cupids in bronze, are valued at 400*l*. each; two others in white glass, "lined" with purple, and engraved, the same price. Two elephants form a liqueur-stand.

There is a perfect canopy of chandeliers over our head, of wondrous design and brilliancy. We gaze amazed at the monumental looking-glasses of St. Gobain and Jeumont. There are also very interesting exhibits of Clichy, Pantin, Sèvres, of private individuals, and of "gobleterie," lustres, laboratory apparatus, windows, lighthouses, &c.; but knowing how valuable your space is, I feel I must glide lightly over all these subjects. The principal centres of the manufactures are in the department of the Nord, the Aisne, Meurthe and Moselle, the Rhone and Loire. Paris is the great market for the sale of all the production of all kinds of glass in France, which amounts proximately to 105,000,000 francs, of which 35,000,000 francs' worth is exported.

Remembering the proverb about "all work and no play," we amuse ourselves before passing into Austria by giving a look at more frivolous things. The section where all the artificial flowers are exhibited is very pleasant. They are arranged so artistically, and vie in their bloom, and form so wonderfully with nature, that had the glass cases been open I should have been tempted to bend down and smell the bunch of Gloire de Dijon roses that was especially perfect; and even a little white flower, perfumed with the natural odour, that was placed in my hand as I passed, deceived me. Every plant of our own Europe, the palms and cacti of the tropics, make this spot a little bower of repose and delight. We wander away from this to what is very artificial, though in the manner it is arranged, without making a very bad joke, it might come under the head of the "Decorative Arts." And that is the hairdressers' exhibit, and which is as instructive as amusing. And when I tell you that there was a meeting the other evening of hairdressers from all parts of the world, organised by the syndical chamber of merchant hairdressers, when, at a given signal, the Turkish March was played, and each one manipulated some especial style on a dummy head, you will understand that it is evident this "art" is looked at in a more serious light than with us. Well, M. Caurse, artist to the Comédie Française, gives us a perfectly historical *resumé*. In the middle of his glass case is a pretty wax head of Madame de Fontanges, powdered, patched, and rouged in the fascinating style that only the marquises of that date (1680) could manage. Then we have a coiffure of Madame de Sévigné; a postilion's wig of the reign of Louis XV. Then we see how people did their hair during the "Reign of Terror" (1792); then in the Restoration (1825); and so on till 1843. The next exhibit is M. Loisel's, a theatrical hairdresser. In his case there are wax heads of Nillson as *Ophelia*, Celine Chaumont, and others, and underneath their photographs and autographs with some such speech as "Bravo and Thanks." A very slight look at these exhibits is sufficient, and then we devote ourselves to Austria-Hungary, as it is called now, and certainly that nation may well be proud of the high place it has taken, most especially in the Fine-Arts department.

We turn at once to the most magnificent historical picture of the Exhibition. The "Entry of Charles V. into Antwerp" ("L'Entrée de Charles Quint à Anvers"), by Mr. Hans Makart, a Tyrolian by birth, a professor at Vienna,—a pupil of Piloty's, and who is not yet forty years of age. On this immense canvas the artist spreads before us the incident actually (for if you retire further away and look through the heavy velvet *portières* between the two rooms, and which then hide the gilt frame, the whole seems instinct with life), and we also are at Antwerp looking at the Emperor as he passes. I should like to try and bring the scene distinctly before your eyes. Charles V., splendidly attired, young,—for I fancy the date of this entry must be between 1518 and 1520, though without referring to some history I cannot be sure,—but remarkable for the serenity and majesty of his presence, is on horseback, advancing towards us. With one hand, the left, he slightly reins back his horse; the other, the right, is extended towards a lovely little boy, evidently, from his gorgeous dress, of noble family, who is holding towards him with one hand a bunch of flowers, whilst he leans against his mother, a very lovely woman. Charles V. is preceded by a bevy of very beautiful young women, in the lightest of costumes, for they are merely draped in veils of gauze. These Bayadères of the North hold in their hands the insignia of royalty, and large branches of plants. On either side the halberdiers and soldiers help to keep the passage clear from the crowd that press on each side. Tribunes and houses are wreathed and dressed with fruits and flowers, and crowded with "fair women and brave men" cheering, waving hands, smiling; Charles's own court follow behind him. Each group has its separate significance, and yet each blends harmoniously into one perfect whole, like the tones of an organ. Over the whole of the Vandyke and Rubens-like tints a golden light seems glowing, as of sunshine. I have heard this tint found fault with; but I have observed the same effect myself on a summer's day. They say some of the lovely faces in this work are drawn from the great beauties of Vienna.

It is said there is no account in history of this gorgeous pageant, but I heard on good authority that Albert Dürer mentions it in a letter; and though the sort of masque-like look the scene bears gives it a tone of unreality, I think that Shakspeare describes something of the same sort in "Henry V.," on his return to London.

ANCIENT RECLAMATIONS.*

A VAST period of blank succeeded the departure of the Romans. Nothing seems to have been done till Norman times. The first work then appears to have been the reclamation of Deeping Fen by Richard de Rulos, in the time of Henry I. Between the years 1248 and 1569 we read of various inundations in consequence of the defective state of the drains and banks. The establishment of a Court of Sewers did something towards improving matters; and we are told that in one case a defaulter was placed in a breach in the sea walls and built in. This reminds us of the dwarf who stopped the hole in the drain at Haarlem with his body, observing that "little people sometimes do great things." In the time of Elizabeth, and more especially in those of James I., commenced the real work of draining the fenlands within the ancient Roman walls. The latter monarch proposed to drain Deeping, Spalding, and Pinchbeck Fens, Thurlby, Bourne South, and Crowland Fens, and it was agreed that Thomas Lovell should undertake the work. Nothing, however, seems to have come of it. In the year 1638, Sir William and Sir Anthony Ayloff made another attempt, and seem to have succeeded fairly well, but owing to the disturbance of the civil wars the country people seized the lands, and the works were neglected.

In the year 1630, Sir Anthony Thomas undertook to deepen the cuts leading to the natural outfall at Wainfleet, and to the artificial over at Boston. This he seems to have executed so satisfactorily that not more than 1,673 acres remained under water. The east, west, and Wildmore fens were finally drained by Mr. Rennie, in 1801, 1803, and 1818, by adopting the Roman system of separating the inland from the fen waters by a catch-water drain. The works have not, in the result, proved wholly successful, and in 1867 an Act was obtained for putting up pumping machinery for draining the fens.

Looking to the south of the river Nene on the map, we notice the great Bedford Level, the history of which is one of the most important in the Fenlands. In the year 1650, in the reign of Charles I., a Dutch engineer, Sir Cornelius Vermuyden, undertook this great work. He seems to have been an eminent man in his calling, and has furnished Mr. Smiles with one of his most illustrious examples of "Self-Help." By his bargain he was to receive 95,000 acres of the reclaimed land as his reward. The obstinacy

* By Mr. J. W. Grover, F.S.A. See p. 907, *ante*.

and insular prejudice of the fenmen, however, were too much for him, and his contract was annulled. At this time, however, Providence put it into the heart of a great English nobleman, Francis Earl of Bedford, to come to the rescue. Thirteen gentlemen joined him, and the Adventurers, for so this company was called, made Vermuyden their engineer. The old Bedford river, Sam's Cut, Sandy Cut, near Ely, Bevill's Leam, Peakirk Drain, and Hill's Cut were the chief drains made, and others were deepened and improved. In the year 1637, at a Session of Sewers held at St. Ives, the level was declared drained, and the 95,000 acres were adjudicated. It appears, however, that the decision was premature, for the works were proved ineffective; and we find the king declaring himself the undertaker of the new works which were found necessary. Before he had done much, the Civil Wars broke out, and the work was stopped. The works he actually accomplished were a bank on the south side of Morton's Leam, extending from Peterborough to Wisbech, and a new river about two miles between the Horse Shoe and the sea below Wisbech.

Wells, in his history of the fens, speaks thus of the character of the Earl of Bedford:—"He was a man of a noble and purely gifted mind; he stood high in the counsels of his sovereign; was the owner of extensive fen possessions; and, above all, was the friend and neighbour of the fenmen. A more striking instance of self-devotion to the wishes of the people and the real benefit of the State appears not upon the record of history." It is sad to find that his labours terminated in "a tremendous pecuniary sacrifice, and base ingratitude was destined to be his ultimate and only public reward." Such, alas! is too commonly the fate of all great public benefactors, no less in the nineteenth than in the seventeenth century. During the commotion of the Civil Wars, this great and good man died, and he was succeeded by his own son William, who inherited his titles and his virtues. He concluded a treaty with Vermuyden, and fresh operations were commenced. The various banks, sluices, and drains then executed formed the most important works which have been executed since the times of the Romans. After four years' labour, in 1653, during the period of the Commonwealth, the Association saw their engagements completed, and were adjudged their reward. Thanksgivings were offered up in Ely Cathedral, for the completion of an arduous undertaking which, from its first inception by Francis, Earl of Bedford, had occupied twenty years. For a few years nothing seems to have been done, but in 1657 the common people of the fens, conceiving a dislike to the works, proceeded to demolish them, and were only kept in order by a special proclamation from Charles II. In 1663, however, an Act was passed by which the original association, consisting of the Adventurers and Participants, as they were then called, became transformed into a Corporation for governing the Level, this Corporation consisting of "one governor, six bailiffs, twenty conservators and commonalty, with necessary powers and clauses." In 1697, this Bedford Level Corporation divided its territory into three districts: the Middle Level, from Morton's Leam on the north to the Old Bedford river on the south, and having Huntingdonshire on its west and Marshland on its east, contained about 120,000 acres; the South Level, extending from the northern one to the Upland country, contained about 173,000 acres; the North Level, from Morton's Leam to the river Welland, covering some 48,000 acres. After the completion of his great work and the rescue of a province from the waters, Vermuyden's name disappears from the history of the Fenlands, and, like most great benefactors of the world, in the general good he seems not to have participated. It is said he died in poverty,—some say in the workhouse, but this has been contradicted. It is certain that he mortgaged all his property to pay his army of Dutch labourers; and he not only reaped no reward, but had an action brought against him by the Bedford Level authorities, and we find him afterwards petitioning Parliament for redress. Amongst others employed under him we find a number of Scotch prisoners who had been captured by Oliver Cromwell at the battle of Dunbar, and also some of the Dutch prisoners taken by Blake in one of his engagements with Van Tromp. One of his sons, it appears, was a colonel in the Parliamentary army, and one of his daughters, Caroline, married a Mr. Thomas Babington.

It is sad to find that great benefactors of mankind do so little for themselves. It is an old and true saying, "If you do pioneer's work, you must expect a pioneer's fate." I suppose it must ever be, whilst human nature remains as it is, that no great work is to be accomplished without the sacrifice of some great man, generally the originator, in its execution. It has been fashionable amongst some writers, who should know better, to criticise the works of this truly great man severely,—he did so much that people think he might have done more. There is a good French proverb, "*Le mieux est l'ennemi du bien*," and this really explains the controversy. In dealing with works of internal drainage it is impossible to foresee all the events which may arise in coming centuries; all we can say is, that Vermuyden did what he did well, but he left still room for posterity to improve on his labours.

The waters of the Level were not discharged by the Ouze outfall at Lynn as swiftly as had been anticipated; and in 1720 a Mr. Kinderley gave it as his opinion that the great bar or impediment to the outlet of the waters was the wide and crooked channel of the Ouze near its mouth, and this could only be remedied by making a straight cut. A violent opposition met this proposal. Six Acts of Parliament and ninety-nine years of discussion ended at last in the Eau Brink Cut being made at a cost of 300,000*l*. As, however, the object of this tract is not to record the modern engineering works in the fens, I will not pursue this subject further, but will retrace my steps to the Middle Ages.

It was in the reign of Edward I. when the important question of drainage was much agitated, Courts of Sewers, as they were called, were appointed, but, as I have before said, very little was done till the reigns of Elizabeth and James I. John of Gaunt is said to have contemplated the improvement of the fens. In the year 1438 one Gilbert Haltoft procured a commission for drainage and settling the marshes in the vicinity of Outwell. The first real improvements, however, seem to have been due to an enterprising churchman, Bishop Morton, and to him Wisbech is peculiarly indebted. He made the cut known as the Leam, which crosses the northern part of the great level from Guyhirn to Standground, and this he afterwards extended to Wisbech. The object was to improve the fall of the Nene, by preventing it from making its circuitous course by Whittlesea and Ramsey and March, below Wisbech. Although suffered to fall into decay for a time, it is said to have improved the outfall. The Wars of the Roses seem to have prevented this great man from carrying out his improvement schemes, as he was much occupied with weightier affairs of State, and amongst other things arranged the alliance between Henry Tudor and Elizabeth of York. He was made Lord High Chancellor of England in 1487. It was not till the reign of Queen Elizabeth that a commission was issued headed by the ancestors of the Fitzwilliam, Cecil, and Montagu families, with the object of draining part of the North Level.

The consideration of Morton's Leam involves some general explanation as to the river basins of the fen country. The principal rivers are the Witham, Welland, Nene, and Ouze, which together with some minor streams drain an area of 6,000 square miles, or about one-ninth part of the whole of England. The area of the fenland is over 1,300 square miles. It has been observed by Messrs. Miller & Skertchley that an important town, generally of Roman foundation, stands at the entrance of each river into the fens, and another at its mouth:—

The	Witham	has	Lincoln	and Boston.
„	Welland	„	Deeping	„ Spalding.
„	Nene	„	Peterborough	„ Wisbech.
„	Ouze	„	St. Ives	„ Lynn.

Originally the tide flowed as far as Lincoln, raising the water in Swanpool 2 ft., but in the year 1500 an engineer named Mayhewe Hake, of Gravelines, was instructed to put a sluice across the river to stop the tidal flow. Another sluice was erected at Langrick, in the year 1543. These sluices seem to have had a bad effect, for they not only caused the silting up of the river, but they caused the landowners to neglect the maintenance of the river banks, which were of much greater importance. In the year 1720 North Forty-foot drain was made by Earl Fitzwilliam for the drainage of the land north of Kyme Eau, by means of which a quantity of water which formerly entered the river at Langrick was carried direct to Boston. Thus the current in the river was weakened, an although in the year 1720 vessels of 250 tons could ascend the river daily, in 1751 only vessels of 40 tons, drawing but 6 ft. of water, could reach the town. Matters were made worse by the erection near the town afterwards of the Grand Sluice. That sluice has been condemned at various times by eminent engineers, but it still remains, and whilst it does no permanent good can be done.

The river Welland is the only river in the fens which has preserved its ancient course, as is proved by the Roman banks near Spalding. Until the drainage of the fens in the seventeenth century, the river divided at Crowland, one portion flowing through Spalding as now, the other, known as the South Holland drain, joined the branch of the Nene at Noman's-land-hirne. In 1660 this was the principal channel; now it is a mere ditch. The Spalding channel became defective in the thirteenth century, and in the beginning of the fourteenth century the adjoining lands were often flooded. It was improved when Deeping fen was drained by the Ayloffs. Vermuyden embanked the east side of the river to prevent the floods from coming over the North Level. In the year 1794 a new cut was made, the reservoir to Foss Dyke, but the river continued to silt up till it was taken in hand by the late engineer, Mr. James Walker, who by an admirable system of training banks of fascine work so strengthened the current that it now gives little trouble.

Of the Nene we hear little till the reign of Henry VII. At present the river passes from Peterborough to Guyhirn, along an artificial cut called New Leam, parallel to which is an older cut known as Morton's Leam, from the name of its engineer, Bishop Morton aforesaid, who constructed it about 1478-90. The original section of the Leam, according to to Dugdale, was 40 ft. by 4 ft., but as this was too small, it was afterwards increased in 1570 by 20 ft. In 1538 this channel having been silted up, it was cleaned out, but it seems to have gone back into decay, for we are told by Dugdale, speaking in 1631, that the Morton's Leam had to be "new-made." In the year 1721 Kinderley proposed and partially executed a scheme for straightening the channel. The river then ended four miles below Wisbech instead of twelve as at present. The cut was not, however, carried out beyond the end of the river, and hence the river below began to decay, and in 1804 we read of persons making hay in its bed.

With regard to the Ouze, which enters the fens at Earith, where it formerly branched, sending one stream in a north-easterly direction to the Nene at Benwick, and another southwards by Ely and Littleport, and thence northward along the Old Croft and Old Welney river to Upwell, where it received the waters of the Nene and the northern branch or west water, and thence passed by Wisbech to the sea, it will be noticed that the present course for Earith is quite different, and is now formed by the Old Bedford and New Bedford rivers to Denver; hence the northern branch and the west river, as it was called, has fallen into decay. The Old Croft river has become obsolete, and from Littleport the waters flow along the ancient but artificial cut known as Brandon Creek, anciently called Heming's Lode, and so by the channel of the Little Ouze past Denver, Downham Market, and Lynn, to the sea. Sir Henry Hobart, attorney-general to King James, in his "opinion" in 1617, as given in Dugdale, p. 372, says:—

1. The river of Ouse (its outfall by Wisbeche decaying) was not only cut straight, but by a new river made from Littleport Claire to Rebbech was let fall into Ouse Parva (or Brandon waters) and thence by Salter's Lode to Lynne haven; its former course from Littleport being by Wellenhee to Welle, and so to the North Seas at Wisbeche.

2. The west water (a part of Ouse Magna) having its course from Erith Bridge to Chatteris ferry, and thence to Benwick, and so to March, was, for the crookedness of the way, conveyed by a new passage called Leame (through Chateriz, Dodington, and March), and thence by Elme Leame to Wisbeche (a course of 16 miles), and so continueth all this way.

3. A great part of Ouse and Nene united descending from Benwick by Great Crosse to Wisbeche; but Wisbeche outfall decaying, they both fall by March to Welle and so into the Ouse at Salter's Lode.

We then come to the formation of the Bedford rivers. Their object was to convey the highland waters from Earith direct to the sea; by a saving

of ten miles between that point and Denver sluice. The great sluice at the Hermitage turns the river into the Bedford canals, and the Denver sluice prevents them from re-entering at the northern end. The formation of the Bedford rivers necessitated the double sluicing of the Ouse, and they further involved the making of Tong's Drain and Downham Eau, for the relief of the Middle and South Levels respectively, which they did not seem to have accomplished, for we find that the sluices so deteriorated the river in 1695, that it was proposed to remove them, because "where boats and barges usually passed in the old river, grass and fodder is now cut." In the year 1713 nature took the difficulty in hand, and a high tide "blew" the Denver sluice "up," but as the Hermitage sluice remained, there was not sufficient water in the old river to produce a scour; moreover, the waters from the mouth of the Bedford river, instead of flowing seawards, turned back and flowed up the old bed of the Ouze and drowned the unfortunate South Level. For thirty-seven years matters remained in the most unsatisfactory condition, but in 1750 the Denver sluice was rebuilt by Labelye, a Swiss engineer, who built Westminster Bridge. Yet we find in 1777 both the Middle and South Levels were "in a most deplorable condition." Kinderley, in 1720, suggested the straightening of the river by the Eau Brink cut to Lynn, but it was not completed till 1821. It shortened the course of the old river two miles and a half, and the low-water mark at its upper end fell from 6 ft. to 7 ft.: a great benefit. It is stated that if the cut had been carried into deep water beyond Lynn harbour its effect would have been still more beneficial. In the year 1827 the river Ouse was still further rectified by a straight cut from Ely to Littleport Bridge, and since then another channel called New Cut has been made from Lynn into the Wash at Vinegar Middle.

It is the object of this tract to set forth archæological facts connected with the drainage of the Fens, rather than engineering ones; but *en passant* I should observe that the great error which all the early drainers fell into was that of looking after the internal condition of the rivers instead of providing for their outfalls. They began, in fact, at the wrong end. Their works should have commenced at the mouths of the rivers, and had these been properly attended to in the first instance, vast expenses would have been saved. But their chief obstacles seem to have been rather interposed by human nature, for we find that Vermuyden's great works were obstructed on various occasions by the Fenmen, who filled up the cuts and pulled down the banks which he had constructed. As Mr. Smiles says in his life of this great man:—"Difficult as it was to deal with the unreclaimed bogs, the unreclaimed men were still more impracticable." They looked upon the Fens as their commons, where they could fish and shoot wild-fowl; hence they met the "adventurers," as the reclaimers were called, with a furious but happily ineffectual opposition. Violent pamphlets were also published against Vermuyden, the most notorious of which were "The Draynes Confirmed," of 1629, and another of about the same date, called "The Anti-Projector; or, the History of the Fen Project"; small 4to. London, 1628. The agitation found vent in popular ballads, which were sung in the streets of the Fen towns about the time of the Commonwealth. A stanza from one of these, "The Powtes (poet's) Complaint," will give an idea of their nature:—

"Come, brethren of the water, and let us all assemble
To treat upon this matter, which makes us quake and tremble;
For we shall rue if it be true that Fens be undertaken,
And where we feed in fens and reed, they'll feed both Beef and Bacon."

In another we find the Dutch pointed at as the chief offenders:—

"Why should we stay here and perish with thirst?
To th' new world in the moon away let us goe;
For if the Dutch colony get thither first,
'Tis a thousand to one but they'll drain that too."

When, as I have before explained, Charles I. undertook the drainage of the Fens, the political troubles of the times reached their climax. In 1637, Hampden's trial on the ship-money question took place, and in the Fen districts the agitation was used for political purposes. It was made out that the king's venture was merely intended as a means of raising money, and in this agitation one Oliver Cromwell, member for Huntingdon, took chief part. He 'stumped" the district, making violent speeches against the reclaimers, and soon became known as the "Lord of the Fens," and so successful was his opposition that the king and his commissioners were forced to abandon the works. They also attacked the Lindsey Level, a district of about 35,000 acres, which had been drained by Lord Lindsey, and let in the waters upon it, killed the cattle, and destroyed the farm buildings.

Vermuyden, inundated by adversity, appeared in 1642 with another pamphlet entitled, "A Discourse touching the Drayning of the Great Fennes," &c., which met with many answers; but in 1649 authority was granted to William Earl of Bedford and others to prosecute the undertaking which his father had begun, and in 1652 the works were declared to be completed. On the 27th March, 1653, the Lords Commissioners of Adjudication, accompanied by the "Company of Adventurers," headed by the Earl of Bedford, the magistrates, and magnates of the districts, attended worship in the cathedral of Ely, when the Rev. Hugh Peters, chaplain of the Lord General Cromwell, preached a sermon on the occasion.

When we reflect on the vast magnitude of the work, — it being no less than the annexation of a territory of 680,000 acres to the area of our country,—we may well join the great Dutchman in the pious remarks with which he concludes one of his speeches:—"I presume," says he, "to say no more of the work, lest I should be accounted vain-glorious, although I might truly affirm that the present or former age have done nothing like it for the general good of the nation. I humbly desire that God may have the glory, for his blessing and bringing to perfection my poor endeavours at the vast charge of the Earl of Bedford and his participants." The best idea of the work of this truly great man will be obtained by an examination of the map which has been compiled from Dugdale and other sources; and where the "Great Fens" as they "lay drowned" according to their authority are shown by a blue tint. The other works, both of the Romans and later times, are also shown generally, and will be best understood by an inspection of the maps. Finally, in conclusion, I will make one remark: The object of our Congress I conceive to be not only the publication of information on the great works of past times, but the recording of the names of great men connected with them. I trust that this Wisbech Congress will give due honours to the name of Sir Cornelius Vermuyden, to whom our country owes so much; and perhaps the British Archæological Association may, in bringing his name forward at this time, be the means of obtaining the public recognition of his great service, by recommending a suitable monument, for he has deserved much from his adopted country, but his memory has been hitherto forgotten.

ON LIGHTNING CONDUCTORS AND ACCIDENTS BY LIGHTNING.

A PAPER on this subject, by Mr. Richard Anderson, F.C.S., was read at the Dublin Congress, and deserves to be widely circulated.

There is reason to believe that 100 persons are killed by lightning in England every year on the average. The terrible losses, both of property and human lives, still occasioned by lightning, are the more lamentable as they are in nearly all cases the result of the grossest negligence. The negligence is threefold,—namely, first, in not providing any lightning conductors at all; secondly, in not placing them in the right position, or in sufficient number to cover a given area; and, thirdly, in not having them regularly tested, so as to ascertain their constant efficiency. Of course, the first-mentioned cause of neglect is by far the most important. It is one alike astounding and baffling all search for a reasonable explanation. Every year brings its regular thunderstorms, more or less in number, and most of them accompanied by fatalities.* All see the terrible lightning flashing over their heads; all tremble before the approach of the electric force, the mere touch of which brings instantaneous death, and yet but an excessively small number of persons make any efforts to protect themselves, their families and houses, against the electric fire from the clouds. Public buildings fare little better than private houses. Even some of the first cathedrals of England, such as Peterborough, have no lightning-conductors whatever, while others, supplied with them, are insufficiently protected, as apparent to any competent observer. A glaring case of absence of protection against lightning is to be found at Windsor Castle, grandest of all the historic buildings of England, and the residence of her sovereign.

Mr. Anderson proceeds,—Having drawn attention to the chief causes of the numerous and fatal casualties caused every year by lightning, I have only to add a few words of advice as to how they might be prevented, or at least greatly diminished. First of all, I think it most desirable that public recommendation should be made, by local and other authorities, to place lightning-conductors on all exposed or high-lying buildings, whether public or private, as well as on those standing near woods and on moist ground. It might be well worth the trifling expense to place simple conductors also against trees in parks, under which there are benches, or where persons are likely to gather during a thunderstorm, they forming a prolific source of fatal accidents. Above all, no church, chapel, school, prison, or other large public building, ought to be without one or more lightning-conductors. There can be no excuse whatever for omitting this simple protective means against death and destruction, which may come at any moment, in the case of edifices devoted to public or national uses. But if it is necessary to greatly multiply lightning-conductors, it is equally so that they should be planned and erected by competent persons, with scientific as well as practical knowledge of the work. There are a hundred circumstances which ought to be taken into account in selecting the best positions for conductors, especially on large buildings and those of irregular construction; and only great experience, as well as cognition of all that we know about the movements of the electric force, can accomplish it. Of first importance are the considerations of the general design of the building that is to be protected; the soil on which it stands, whether dry or moist; the presence of masses of metal in or near the roof or the walls, as in the case before mentioned; the position of the chimneys; and similar matters affecting the course of the electric discharge of the clouds. It would be quite impossible to lay down absolute rules on the subject; still protection against lightning may be effected with the greatest certainty under the guidance of well-known facts and observations which throw light upon the undeviating path of the mysterious electric force. But if everything possible has been accomplished towards the erection of the most perfect lightning-conductor there still remains something to be done. It is, not only to construct a faultless conductor, but to maintain it always in good condition. This is a matter which, sadly neglected and overlooked to a quite astounding degree, cannot be too much insisted upon. It ought to be universally known that a lightning-conductor is worth nothing unless it is periodically tested. The testing should take place at regular intervals, perhaps best in the spring, before the advent of the summerly thunderstorms, and it should likewise be made whenever a building has been undergoing repairs, which may have damaged the conductor. To show the importance of constantly testing even the best-laid conductors, I can cite an instructive case, where a house was apparently well protected. On August 19th, 1876, shortly before midnight, a heavy stroke of lightning fell upon the mansion of Mr. Evans, civil engineer, Clayponds, near Kew Bridge, Middlesex. The electric force destroyed the top of a large chimney, knocking off part of the coping, not more than 2 ft. or 3 ft. from a lightning conductor, to which it then flew, making its way down to the earth, but not without causing the greatest disturbance all along its path, lifting up, among others, some heavy marble toilet-tables in bedrooms some 6 ft. distant on each side from the copper rope, which, under ordinary circumstances, would have carried the electric force noiselessly, as well as harmlessly, to the ground. The fact of this disturbance indicated at once the source of the mischief. The lightning conductor, good as it otherwise was, had no sufficient earth connexion. It went into the earth, it is true, but into soil

* Mr. G. J. Symons, the well-known meteorologist, who incessantly watches the skies from his house in Camden-square, mentions that in two storms, in June, 1872, nearly two hundred separate accidents came under his own knowledge, causing the death of ten persons and injury to thirty-three others. The lightning struck sixty houses, fifteen of which were burned down, and killed twenty-three horses and cattle and ninety-nine sheep. "This is," truly remarks Mr. W. H. Preece, commenting upon the figures, "the imperfect record of only two storms. What must it be for the whole year?"

altogether dry, and therefore the conductor did not, and could not, act properly. It thus came to pass that, first of all, the lightning did not touch, as it would otherwise have done, the conductor directly, but sprang upon the coping of the neighbouring wall, and that, although it made its way down into the earth afterwards, it did so, as it were, with the greatest effort, which caused the lifting up of the marble tables and other disturbances. Nothing was wanting in this case for protection against lightning but regular testing, in default of which it can never be known whether a conductor is actually efficient at any time. A well-organised system of inspection of lightning-conductors would be most inexpensive. The galvanometer used for the purpose has been latterly much improved in Germany, and small portable instruments, of the size of a diminutive carpet-bag, are now made, which leave nothing to be desired in the shape both of effectiveness and durability. As the clock in churches and other public buildings is methodically inspected by the clockmaker, so ought every lightning-conductor to be as systematically examined by an electrician or other competent person. Already such a system of inspection and testing of conductors exists in Paris and several other French towns.

IRISH ANTIQUITIES.

THE proceedings of the Dublin meeting of the British Association for the Advancement of Science were wound up with a series of excursions, during which they visited the great round tower of Donoughmore and the remnant of the neighbouring church. While the party gathered around the entrance, Mr. W. K. Wilde discoursed of round towers and the theories of their uses. The one at Donoughmore, he said, is perfect in every respect save that the cap is missing. It rises in six stages 106 ft. high. It is remarkable among its brethren for one altogether unique bit of evidence of its Christian origin. The entrance-door is raised some 12 ft. above the ground, and the keystone of the entrance arch is sculptured with what Petrie thought to be a rude representation of the Crucifixion,—the figure having its arms extended at full length, and the legs crossed after the manner of most early Christian crucifixions. Professor Zerffi controverted this view by pronouncing the sculpture to be a Buddha, and by stating that the Irish round towers were of the same character as those found scattered through Mexico and Peru, and were, in fact, gnomons to mark the time of day. Mr. Howarth, of Manchester, however, pointed out that the Buddhist idols have never their arms extended, and that when Irish antiquaries of the rank of Petrie and Lord Dunraven had agreed that the towers are of Christian origin, other people should be cautious before giving their opinions. Proceeding to the Marquis Conyngham's magnificent demesne at Slane, the party visited the Hermitage of St. Erc, the first Bishop of Slane. Portions of the original masonry are still distinguishable amidst the arches and windows of later centuries. Much was said by Mr. Wilde about the entrance-arch, carved with the emblems of the fleur-de-lys and the rose. Luncheon was partaken of on the Hill of Slane, and after a breezy ride through the valley of the Boyne they reached the royal cemetery of the Brugh-na-Boinne. For fully three miles this necropolis extends. Twenty-one immense tumuli or hillocks of stone and earth can be counted in the neighbourhood, each of them presumably built over the ashes of an Irish monarch. The three greatest of them are those at Nowth, New Grange, and Dowth. The excursion-party visited all three; but their explorations at New Grange were of special interest. This tumulus covers more than two acres, and might be taken for a large natural hill if there were not indisputable evidences that it has been heaped loosely together by the toil of man. It is surrounded by a circle of cyclopean gravestones, which, it is thought must have been transported thither from the Mourne Mountains, in the county Down. A passage has been found into the heart of this mighty pass, and the visitors crept through it in parties of fifteen. The first dozen yards had to be traversed on all-fours. In one spot the upright flagstones, of which the gallery is formed, jut so closely together that the body is squeezed through with some difficulty; but once this trouble is surmounted, the passage rises to a height of 6 ft., and then suddenly opens into a large cruciform chamber, with one great central domed apartment and four recesses at its angles. This chamber is some 19 ft. high to the top of the dome, which is formed by small stones gradually overlapping one another until they culminate in a great flat slab, which serves the purpose of a keystone. The walls are of Cyclopean masonry, and are stated to bear an extraordinary resemblance to those of the tomb of Agamemnon at Mycenæ, as Dr. Schliemann describes them. The stones are in many places carved with the distinct sort of archaic sculpture—spirals, lozenge-shaped, and zigzag lines. Mr. Wilde, in the course of his interesting talk about the tumuli, broached the theory that these tumuli must have been the work of the tall, yellow-haired, blue-eyed race of the Tuatha de Danaan, who ruled over Erin after prostrating the power of the Filbolgs. The party lingered so long in the recesses of this astonishing sepulchral cave, that there was no time for an examination of its brother tumulus at Dowth. They drove through Mr. Gradwell's demesne, and enjoyed afternoon tea in his mansion at Dowth Hall. In the demesne, a few hundred yards from the Boyne, they visited a circular rath of vast extent, enclosing little less than an acre within a single mound. Nobody was able to throw much light upon the name, date, origin, or business of it, but Mr. Wilde supplied the gap by an interesting sketch of the uses of Irish raths in general. Two miles more along the course of the river brought the party upon the famous battle-field of the Boyne, whence they returned to Drogheda.

The Kilkenny excursion started from the King's-bridge terminus at a quarter to nine o'clock. The excursionists numbered 300. The party on reaching Kilkenny visited the Protestant Church of St. John, in ancient days a Priory of Canons Regular, and founded by William Earl of Pembroke in 1220. St. John's was in olden days famous for its singular beauty, and was known as the "Lantern of Ireland," from the great number and singular beauty of its windows. In its present state it possesses scarcely a trace of its pristine beauty. In the church Mr. J. G. Robertson delivered a very interesting sketch of the history of this ancient edifice. Outside the church another equally valuable address was delivered by Father Neary, who, in the course of his address, alluded feelingly to the regret which all felt at the absence through illness of the Rev. Mr. Graves, who had done so much for the antiquities of Ireland, and especially of Kilkenny. Father Neary called special attention to the really interesting remains of the old church, which are outside the present edifice, and consist of a lancet window of great size and beauty, and a knightly tomb five centuries old, in which a noble of the name of Purcell and his wife are represented, in two fine statues of black marble, sleeping side by side. The next halting-place was the Protestant Church of St. Mary. The Very Rev. Dean Hare here welcomed the visitors, and pointed out all that was worthy of interest. The ancient beauty of St. Mary's has also largely disappeared, but it has a great number of fine tombs inside and outside the church. One of these, erected to a member of the once powerful family of Rothe in 1637, has recently been restored by Mrs. White, of Killakee. After the inspection of the riches of the church and churchyard was completed, the Mayor conducted the visitors to the Tholsel, or Town House, where they were entertained by the corporation. After the *déjeûner* Mr. Watters, town clerk of Kilkenny, read a sketch of the antiquities of the city.

After luncheon several places of note were visited, including the Mediæval houses of the Rothe family, and the Wolf's Arch, and the fine ruins of the Franciscan Abbey in Smithwick's brewery, remarkable for its delicate seven-light window, its graceful tower resting on groined arches, and its singular grotesque carvings supporting the arches. Proceeding through the town the grand object of Kilkenny was reached,—the Protestant Cathedral of St. Canice. Above the cathedral proper is the grand old round tower, which for twelve or thirteen centuries has defied the storms of time. Beneath its shadow is the great cathedral church, which 700 years ago Bishop Felix O'Dullarney erected in honour of St. Canice. It contains scores of monuments of the highest interest. The architecture and antiquities of the cathedral were explained by Mr. Langrishe, diocesan architect, in an interesting paper. The next point visited was the Dominican Church, or Black Abbey. This ancient edifice is of great interest to Catholics, seeing that it is almost the only church in Ireland which, erected in pre-Reformation times, still remains a Catholic church. Its history after the suppression of the monasteries was related in a paper prepared by Father Neary, and read, at the request of the prior, in the church by the Rev. Mr. Callanan, the administrator of the Cathedral parish. The day concluded with a visit to the castle, where the visitors were welcomed by the Marquis and Marchioness of Ormonde. Although much of the structure is comparatively modern, three of the towers and two of the curtain-walls of Strongbow's castle remain to this day, and notwithstanding modern alterations impress the grand outline of the ancient Norman fortress on the structure. The party afterwards returned to Dublin.

Another party of excursionists visited the Rock of Cashel, the ruins on which are so well known. The round tower stands to the north of the church. It is 80 ft. high by 50 ft. in circumference, and the walls are 4 ft. thick. The two foundation layers are of limestone, and the remainder of sandstone. It contained five stories and four apertures, with a doorway entrance 12 ft. from the ground. The ruins, together with Hore Abbey and the Dominican Abbey in the town, are now in charge of the Board of Works, under the provisions of the Church Act; and it is satisfactory to be assured that no further ravages and decay await the precious relics. The Dean of Cashel acted as *cicerone*. He inclines to the Petrie view, that all these old buildings and sculptures are of Christian Irish origin. He, however, admitted that there is something arbitrary and insular in claiming as specialities for Ireland art objects which are found from here to Hindostan, and he felt the difficulty of imagining that this wondrous magic art sprang up here in a night like the Prophet Jonah's gourd, and then in an hour became an obsolete antique. He said that he did not like the Keane theory at all, but that as the Danish theory was pure nonsense, the contest lay between Keane and Petrie. After allowing an hour's inspection, Mr. Mahaffy read a very interesting paper on the ruins.

These notes are condensed from a long report in the *Morning Post*.

A LONG-LOST CITY.

AT the Annual Congress of the Somersetshire Archæological Society, held last week at Bruton, Mr. Kerslake, of Bristol, read a paper on "Pen Pits," for the purpose of showing that these remains, situated on the brow of a hill not far from Stourhead, and which had puzzled archæologists from the time of Camden, were really the site of an ancient British metropolis. It was called in the earliest written records "Caer Pensauelcoit," the last syllable meaning *wood*, so that in "Pen-sel-wood," as the place was now called, they could at once identify this archaic name. The hut circles covered 700 acres of land, and were about 20,000 in number.

The next day, the Society drove to Pen-selwood, in number about 100, when the Rev. T. W. Wilkinson called attention to Pen-pits, which are in his parish, and read an extract from a former number of the *Builder* describing the remains of an ancient British city still extant in Wales. The account herein given confirmed the views entertained by Mr. T. Kerslake with reference to the Pen-pits. About fourteen acres of glebe land are covered with these pits, and as some doubt had been thrown on Mr. Kerslake's theory because no water was supposed to exist on the spot, Mr. Wilkinson said that this was an error, inasmuch as there were springs on his land. He also offered to arrange with his tenant so that the Society, if so disposed, should carry on excavations in order to see if remains could be found to confirm the existence at an early period of a large population at this spot. The excursionists then adjourned to the pits, which, whatever their origin, are very remarkable. The summit of the hill, for the space of 600 or 700 acres, is completely honeycombed with cavities, varying in depth and size, but all preserving a circular shape. So closely are they packed together as to leave no more than room for one person to traverse the margin between them. They are lined with ferns, gorse and briars, the thickness of which imparts not a little beauty to the uneven surface. Though we have called it "the summit of the hill," the ground covered with these indentations really forms a hollow as compared with

the land around, and occupying such a depression, it would add to a commanding situation the strength of concealment. Groups of circles marking the primitive settlements of an early people exist in different parts of the country, but nothing approaching to the vast agglomeration at Pen-pits is known anywhere else. They are unique, and that of itself favours scepticism, besides presupposing a degree of civilisation and a power of organisation with the possession of which the aboriginal races, or the forerunners of the Romans, have not been hitherto credited. For this advanced social condition Mr. Kerslake cogently contended in the paper read by him on the ground, and his views were supported by the Rev. Prebendary Scarth and Bishop Clifford. The former was inclined to make the dwellers of Caer Pensauelcoit contemporaries with Stonehenge, Abury, and Stanton Drew, but at the same time strongly advised the Society to conduct some systematic investigations on the spot. Bishop Clifford urged the importance of the latter point, and contended that a large community like that supposed could not have existed without leaving behind some traces, such as bones, ashes, implements of the chase, or fragments of articles in daily use. With regard to the idea that the people dwelt in the pits, that he thought was altogether erroneous. He had lately been studying the scenes depicted on the column of Antoninus, at Rome, and he there saw that the Germans were represented as dwelling in round huts, with a rude basement of stone and a superstructure of wood or trellis-work, filled in with clay or wattling. There was one door and no window. He conceived that it was some such buildings that stood on that spot, with the floors sunk some little depth. When the huts were deserted they crumbled away and so formed higher ridges round the site of each habitation. The Rev. W. Hunt remarked that Mr. Boyd Dawkins considered that the pits were simply the remains of old quarries. Bishop Clifford said the answer to that objection was that no one would think, in quarrying for stone, to dig separate pits in that fashion. The plan would be to dig down and then follow the beds in a straight line.

Mr. Hunt explained, before leaving, that the question of conducting investigations on the spot had been considered that morning and it was thought better to appoint a committee, including some gentlemen living in the neighbourhood, and to make a grant for defraying the expenses. This announcement was received with marks of approbation.

LEAD AND ZINC MINES.

THE exhaustion of the Belgian zinc mines, some years ago, led to a new search for the components of which this metal, so important to the industrial arts, and to the builder especially, is composed. Formerly, though many sources of supply existed elsewhere, the principal known mines existed in Belgium and Silesia, but in consequence of the former having practically failed, explorations were made, more or less successfully, in Sweden and Spain, though afterwards, almost accidentally, a splendid treasure of these minerals was discovered at Malfidano, in Sardinia, and, of course, a company was established to develop it, with a view of answering the Belgian and British demand. The name of Malfidano was adopted, for the sake of simplicity, but, in reality, these lead and zinc rocks, as they are called, constitute seven or eight groups, spread over about 3,000 acres of ground, for the most part absolutely barren, being nowhere able to support more than a sprinkling of goats and sheep. It was necessary, therefore, to create a community upon the spot, and provide them with the means of sustenance, and the central establishment was, for many reasons, fixed at a spot not far from the sea. Round it have now grown up a multitude of edifices, various in kind and use, though the chief of these, of course, are connected with the working of the mines,—ten ordinary and six reverberating furnaces, three enormous sheds for the storage of the calcined minerals, occupying altogether a surface of 2,000 square yards; another, about a fourth of the size, for materials; a huge forge and fitting workshops, with several others supplementary to it; a number of stables, a little street of shops for the sale of necessaries, a hospital, twelve houses for the accommodation of the officials, and an increasing cluster of buildings as dwellings for the miners and their families,—all constructed of masonry, and roofed with tiles. In various directions, other branch communities have sprung up, on a smaller scale, but similar plan, and, taken as a whole, the mines of Malfidano may be computed to support a population of rather over 1,000 individuals. Moreover, connected with the mines by a double line of railroad, is an extensive dyke—200 yards in length, indeed, built in the sea, with a depth of 7 ft. to 16 ft. of water on the exterior side, the space within having been filled up with stone so as to form a quay containing about 10,000 square feet of area. In a very few years this miniature city was called into existence. With reference to the mines themselves, there are three classes of them,—those which are open to the sky, and resemble immense jagged quarries; others carried through galleries, and connecting these; and others, composed of slanting and radiating galleries, following the ore wherever it presents itself, and creating curious labyrinths beneath the earth. A characteristic of the Malfidano works is that, as soon as a pit is pronounced exhausted, it is filled up, for the sake of preventing accidents, with rubbish from the next series of excavations, which are thus carried on without altogether honeycombing the rock with hollows. At some points, however, the ground is dug down to a depth of ten or twelve yards; beneath this it is burrowed to three or four times that depth; and below this, again, a perfect network is eaten out of the rock to a considerable distance in every direction, though, in many parts, it is found necessary to shore up the friable roofs and walls; for the substance of the strata is too valuable for much of it to be left as supporting buttresses or pillars. Elsewhere, a kind of exaggerated serpentine form is adopted, and the miners, having reached a certain limit, turn back upon a curve, advance as far as the head of the working, turn again, once more upon a curvilinear line, and so on, until the labyrinth assumes a sort of gridiron shape—a process, however, which, though easy, is regarded as exceedingly wasteful.

For this labour the men are not paid by regular wages, but for every cubic yard or ton of mineral extracted; nor is the scale the same in all the mines; being in some five, and in others fifteen, for the same measurement or weight. There are galleries, again, in which their earnings depend upon the rate of advance made,—and here, too, the range of payment is remarkably wide, varying from two to ten pounds sterling, English, for every three feet, according to the richness of the results; while, besides this, there are prizes awarded to the more intelligent or fortunate individuals who happen to hit upon a favourable course through the rock. In this way, an emulation is excited, by which the proprietors assert that they have not lost. The expenditure of Malfidano, therefore, varies considerably, as does the worth of its products; but it is confidently anticipated that Sardinia possesses numerous similar stores of the same wealth, and that the workings now measured by hundreds of yards will, before long, be carried on for miles beneath that which has hitherto been regarded as the most ungrateful and hopeless part of its soil. Moreover, it is hoped that, in due time, the processes carried on on the spot will be rendered much more elaborate and effectual. At present they are confined to the simple calcining of the "calamine," or zinc ore, and for this purpose the furnaces employed are cylindrical in shape, about 16 ft. in height above that which Italian miners term the "gridiron," or stoke-hole, and each capable of containing some thirty tons of mineral material, arranged in layers, separated by other layers composed of coal and charcoal in almost equal parts. The cost of these structures, up to the present time, has averaged about 120*l.* each, but the whole of the fuel, since the forests of Malfidano were recklessly burned out of existence, has had to be brought a long way upon difficult roads, which, in many instances, had to be specially prepared for the purpose, so that the calcining itself cost, in this respect alone, nearly 10s. a ton; and yet the Malfidano mines are exceedingly profitable. Lately, however, sea transport has largely superseded that by land, notwithstanding the irregular winds that, at all seasons, blow in the roadstead of Buggera. As to the men engaged, although the company is French, they are almost exclusively Sardinians, who possess certain particular aptitude for the work, and especially a power of withstanding extreme intensities of heat. They earn from 2s. 6d. to 4s. a day, upon a general calculation; but it is expected that a larger proportion of the profits may be devoted to the payment of labour, so soon as the steam and tramways, and the ordinary roads necessary to the full development of the works, have been completed, or nearly so. Wagons of many sizes have had to be provided, with metal ropes for haulage, and a special class of vessels for the sea-transport of the ore. It is not exclusively men, however, who are employed. There are also women, and even children, not one of whom has been brought from the Continent, though some of their husbands are Lombards or Tuscans. As a rule, all these people are decently educated, and their social manners are superior to those of many other populations of the Italian peninsula. There is a labour law for the mines, enacting that no one shall toil for more than ten hours a day in the open works. Even with this restriction, the labour is not considered healthy, especially by the "Continentals," as distinguished from the "Sardes," or islanders, many of the former returning to their homes during the months from June to September, and often taking considerable savings with them, while for those who stay a hospital is maintained, partly by the providence of the miners, and partly by the liberality of the proprietors,—an institution, too, meriting a word of notice. Spacious, well-ventilated, affording ample room for every patient, furnished with iron bedsteads and irreproachable bedding, having a surgeon, with two assistants, whose exclusive services are commanded,—a strict register of every case, it is certainly such an establishment as would not be expected to be found in a wild and lonely district of the Sardinian coast, wholly given up to mining for lead and zinc. Indeed, the entire locality, to which a social life has so recently been given, and which is scarcely known beyond its own limits, possesses a more than common interest, above the importance of its products to English or to Belgian industry. The coal it consumes comes principally from Cardiff and Swansea, while the charcoal is burnt in the forests of Sardinia itself.

THE OBELISK ON ITS PEDESTAL.

BY the time the men left work last Saturday the monolith had been lifted to the height required (50 ft.) with a view to its being swung from the horizontal into the vertical position and set at rest upon its pedestal, which operations took place on Thursday last. The pedestal was finished last week. In the top course room was left (by not laying for the present the middle row of stones east and west) to allow of the passage of the wrought-iron strap. In this strap (which is of the dimensions and construction of a girder, being built up of plates and angle-irons), it will be remembered, the obelisk's foot rests as in a stirrup to prevent the stone from slipping out of the iron jacket which encases the centre of the stone. The obelisk, as we have already stated in our description (p. 679, *ante*) of the mode in which it was to be raised, has been carried to its present height by means of elevating, by hydraulic jacks, a pair of iron girders working upwards in grooves left in the main angles of the scaffolding. Upon these girders a pair of peculiarly-formed trunnions projecting from the iron jacket before mentioned have rested, and have supported the obelisk in a horizontal position during the time it was being raised. The monolith having attained the necessary altitude, it was only necessary to swing it on the trunnions, or, in other words, to pull down the butt or thick end, so as to get the stone into a vertical position, when it was only a few inches above the top of the pedestal. The operation of "swinging" was completed in about three quarters of an hour, and by lowering the girders before mentioned, the obelisk was allowed to rest on its pedestal, and the "Union Jack" and Turkish ensign were run up in token of the success of the work. The iron jacket and strap will now be stripped off, and the scaffolding removed.

For the accommodation of those who have taken a special interest in the progress of the work, Dr. Erasmus Wilson and Mr. John Dixon chartered a steamer, which was moored abreast of the works. Those gentlemen are to be heartily congratulated on the success which has attended their difficult undertaking, concerning which we shall have something more to say.

YORKSHIRE ARCHÆOLOGICAL SOCIETY.

HEMINGBOROUGH AND SELBY.

THE Yorkshire Archæological and Topographical Association had its twelfth annual excursion on the 28th of August, the locality selected being Selby and Hemingborough. Trains from Leeds, Huddersfield, York, Hull, and other places, brought many excursionists to Selby, and on their arrival the party, which numbered nearly 200, was conveyed in two steamboats to Hemingborough. As the company approached Hemingborough Church, the prominent spire of which, standing as it does 126 ft. above the tower battlements, is visible for miles around, the bells rung out a peal of welcome, and the party were received by the vicar, the Rev. W. H. Wright, B.A., and churchwardens. After a brief inspection of the curiosities of the church Mr. Fairless Barber, F.S.A., one of the hon. secs. of the Association, read a paper on its history, and pointed out some of its principal features. He stated that the evidence of the architecture showed that there had been four complete buildings, and that parts of the three latest had been blended together to form the present fabric. The church, under this process, took 350 years to grow to its present size, and had continued to exist very much as it now was for 350 years more. The first church was that mentioned in the Domesday survey. Of this building no trace was visible, but it was the undoubted parent of the church which followed. Dr. Burton was very concise in his account that William the Conqueror gave to Bishop Walcher, of Durham, "this his royal manor and town of Hemingburg and the church thereof"; but this statement was subsequently demolished by Canon Greenwell. Of the second church they found traces in the eastern half of the north and south arcades of the present nave. Its arches were in the so-called Norman or English Romanesque style, very plain and simple in character. With reference to the third church, they at once found ample indications of its extent and character. First they had the nave of the second church, extended two bays westward by two pointed arches on each side having plain round columns, with single caps for central supports. The lines of the roofs of this third church still remained in each side of the tower, and showed clearly that there was no clearstory, and the nave, chancel, and each end of the same transept were covered with roofs of the same high pitch, continued downwards over the aisles of the nave and the single aisle of the north transept. Coming to the fourth church, Mr. Barber said that the above additions were added to the third church to give them the noble fabric in which they were assembled. They had first the addition of the aisle or chapel on the south side of the chancel, opening to it by the entire removal of the wall, and building in lieu thereof an arcade of four-centred or Tudor arches on piers, the capitals of which had carved foliage, not gracefully executed, of the same date. They had also a similar arch broken through the east wall of the south transept to connect this new chapel with it. All the windows of this south chapel were late and by no means pleasing examples of the rectilinear period. This was the most important addition, and was accompanied by the erection of the chapel on the north side of the choir by Sir John Babthorpe. Overhead great changes were at this time made. A magnificent spire was added to the tower, the really fine rectilinear clearstory of the north and south transepts was built, and tracery of the same period introduced into all the windows of the north and into the south window of the south transept. The character of the roofs could be readily made out by a careful examination of what was left. It was not clear that the pointed roof of the choir was not then erected, for there was such a recent look externally about the eastern gable that it and the present flat roof, which seemed modern, might be of late date. Of Mediæval monumental remains none are left perfect. There is a mutilated figure in the Babthorpe Chapel, representing a skeleton in grave-clothes, and he (Mr. Barber) understood that it had been the practice in past years to be sworn before this effigy. Alluding to the registers, he said they contained some most curious entries, including one of a cock-fight having taken place in the church on February 11, 1661.

Luncheon having been partaken of in the Public-rooms, the Rev. Mr. Ormsby proposed "The health and prosperity of the Society." Mr. Fairless Barber in responding, referred to the substantial position of the association. He stated that they had received from 112 life members and 11 deceased members 645*l.* 15*s.* The total number of annual subscribers was 314, and the income from this source was 164*l.* 19*s.* The society had now really a capital account of over 1,000*l.*, and he was not aware of any other society, except the Antiquary Society, which was in so good a position.

The company then visited the Abbey Church of Selby, under the guidance of Mr. J. T. Micklethwaite, F.S.A., who gave an address relative to its history.

Mr. Brooke also spoke, and said that the church was dedicated to St. Mary and St. Germain. It was the best preserved Benedictine church in England, and Yorkshire ought to be proud of it.

Mr. J. Fowler, F.S.A., of Wakefield, next read a paper on the ancient glass of the east window. It belongs to the first half of the fourteenth century, and must when perfect, it is said, have been one of the most magnificent in existence. The design is to indicate the first and second coming of the Saviour.

The remainder of the time at the disposal of the company was spent in inspecting the edifice, and Mr. Morrell exhibited some curious paintings of the gatehouse of the abbey, the abbey well with the original central tower of the church appearing in the background; and the gateway and middle row extending from it to the Market Cross.

THE ORIENTAL CONGRESS AT FLORENCE.

THE fourth Congress of Orientalists held in Europe is now taking place in Florence, commencing on the 12th and ending the 18th. The first took place in Paris, the second in London, the third in St. Petersburg, and this, the fourth, is expected to be the most brilliant, as at the same time the most learned and effective. None but students of Oriental languages and the professors and learned visitors are to be present at the respective meetings, at the first of which will be under consideration the Semitic languages, including the Assyriac; at the second, the African, including Egyptian; third, the Indian, comprising the Armenian; fourth, Hindoo-European Philology; fifth, Language of Central Asia; sixth, Language of the extreme East, comprising Polynesia. The meetings are to be held in the Luca Giordano Hall of the Palazzo Ricardi (now the Palace of the Prefect). A hundred of the most learned among the Oriental philologists are expected to take part in the proceedings of the Congress, among whom may be reckoned about sixty foreigners to Florence. Among the latter may be mentioned Renan, Lenormant, Oppert, Schefer, Masperd, Barbier de Meynard, Leon de Rosny, of French celebrity. From England come Rost, Beale, Sayce, Legge, Chenery, Deane, and others. From Germany, the celebrated Indianist, Weber, Roth, Benfeg, Tusti, Pertsch, the Semitic scholar Krahl, Weil, Merx, Dieterici, &c. Two learned linguists come from Denmark, two from Scandinavia, two from Iceland, two from Finland, five from Russia, two from Hungary, two from Spain, two from Roumania, Professor Whitney from the United States, &c. The Senator Amari is the president of the Congress, himself a deep student of Arabic; Professor Angelo di Gubernatis, Professor of Indian languages, the Secretary-General. An interesting collection of Oriental manuscripts, works of art, &c., will be exhibited to persons invited by the committee. A number of Eastern musical instruments, the property of M. Krans, will be added. Many are sending from their private collections objects of interest, the whole forming, though small, an exhibition instructive and admirably adapted to the occasion. The *salons* of some of the Florentine nobility and of Prince Demidoff will be opened to receive the eminent men attending the Congress, which promises to inaugurate the earnest movement made to render Florence the seat of literature in Italy,—its Athens.

The Chapel of the Felstead Grammar School has lately had a large subject of the Ascension fixed, being one of a series. It is painted on linoleum. The drawing of the figures is from life, slightly conventionalised. It was designed and executed by Mr. J. R. Thomson, of Southwark, under the superintendence of the architect, Mr. F. Chancellor.

THE ELECTRIC LIGHT AT THE PARIS OPERA-HOUSE.

IT is well known that the superb paintings which adorn the crush-room (*foyer*) of the Grand Opera House, as also many of the details of the interior decorations of this magnificent building, lose much, and in every way, from the circumstance that they can be seen at night only by gaslight, which is quite insufficient, notwithstanding the multiplicity of apparatus for lighting up dispersed about the rooms of this enormous edifice; and besides, the sulphurous emanations and sooty deposits are rapidly affecting the colours on the ceiling and the panels, at the same time that they are tarnishing and dirtying the gilding and mosaic work. M. Garnier, and the principal artists who have contributed to the decoration of the Opera-house, are very anxious about this state of things, and they think they have found the means of warding off any serious results. A few days ago, M. Garnier and his chief colleagues were present at some experiments for lighting up the interior, especially undertaken to study the effect of the electric light on the pictures of the ice buffet, just newly inaugurated. From the point of view of decorative effect, the superiority of this new light is incontestable. Blue, which in the gaslight takes a green tinge, and pink, which turns to orange, preserve under the electric light their delicate tints. There was only one opinion on this subject amongst all the connoisseurs thus met together.

As to the preservation of the works of art for the future, it is certain that a light which emits neither heat nor sulphurous and sooty smoke solves for artists and for the public so important a question that it has been resolved to interview the Minister of Fine Arts on the subject. An official request will be made by MM. Garnier, Baudry, and colleagues, that the *foyer* and buffet may be lighted during a certain time with the electric light. All the artists, sculptors, and administration of the "Beaux Arts" will be convened to discuss this interesting innovation, and it is scarcely doubted that the Ministry and Administration of the Grand Opera will assist in carrying out their views.

WARRINGTON INFECTIOUS DISEASES HOSPITAL EXTENSION.

THE foundation-stone of extensions to this hospital has been recently laid. The present hospital buildings consist of a twelve-bed ward, outbuildings, and lodge. The buildings which are now being erected comprise a twelve-bed ward, four-bed ward, and an administrative ward. The site is capable of holding two additional twelve-bed wards, which no doubt will be built when occasion requires. When the whole is complete it is expected there will be accommodation to treat the principal diseases of the zymotic type. In laying out the buildings real isolation has been aimed at, and care has been exercised to make them as complete as possible for the treatment of disease, and they have been designed to get as much internal comfort and space at a minimum of cost, and the health of the sick not sacrificed to architectural effect. The wards are built of brick, with slated roofs, and have been designed on the detached block system, viz., to keep each block of buildings for treatment of separate diseases. Each hospital is complete within itself, having accommodation for male and female patients, the centre being occupied with rooms for the store of linen and other matters connected with the working of hospitals of this description, and with nurses' compartment designed that in emergent cases the nurse can reside in the ward. At the end of each ward are sculleries with sinks, also water-closets and bath-room. The baths will be so constructed that they can be either used in the room or wheeled to the bedside of the patient requiring them. The wards are fitted throughout with the patent Manchester grates, which pass a copious supply of warm fresh air to the room, the fire-place acting as an exhaust for the vitiated air; whilst the ventilation of the wards has been obtained by means of slide grids, windows, and diaphragm ventilators through the roofs. All the walls are cavity walls with slate and pitch damp-proof courses, and the ground underneath the floors is concreted, so that as far as practical damp is excluded. The air-space in the wards is 2,280 cubic feet for each patient, which is a little above the Government standard for hospitals of

this type. The outbuildings comprise a mortuary, ambulance-shed, and disinfecting-room, laundry, and boiler-house. The disinfecting-room has been fitted up with Goddard & Massey's patent disinfecting stove, which is worked by gas, and is capable of being heated to 250 deg. Fahr. This is considered requisite to destroy any germs of disease which might possibly be in any bed or other clothing used by the patients and which require disinfecting. A close-covered van is connected with the disinfecting department, so that clothing or bedding can be removed from houses in any part of the town that may have had infectious cases in, and so taken and passed through the disinfecting process to render innocuous any germs of infection, and thus tend to prevent the spread of disease throughout the town. After being disinfected they are returned in the van to the owner. The laundry is fitted up with wash-troughs and mangling-machine, to facilitate the speedy washing, &c., of infected articles. The administrative ward is entirely separate from the hospital wards, and comprises suites of rooms for nurse and surgeon, including dispensary room, stores for linen, kitchen, and other offices. This building occupies the central position close to the entrance and fronting Aikin-street. From the back of this ward a sheltered or covered corridor, with open sides, will be constructed, connecting each of the wards, which can be utilised for a walk or exercise ground for convalescents. When complete, there will be a communication by bells from each of the wards to the administrative department, so that no time will be lost when the immediate services of the officials are required. The kitchen of the administrative ward will be fitted up with a Leamington cooking-range, and the cooking for the patients in all the wards will be conducted in this department. The whole of the buildings will be supplied with waterworks water, and hot water will be conducted to each of the each of the wards, baths, &c., by a boiler fixed for the special purpose.

The hospital was designed by Mr. R. Vawser, formerly surveyor to the borough, and is being erected by Messrs. J. Gibson & Son, under the direction and superintendence of Mr. Longdin, the present borough surveyor.

AN INVENTOR.

MR. WILLIAM H. THOMSON seems to possess a natural inventive genius. The Edinburgh *Daily Review* gives an account of some of his doings. One of his inventions is a machine which is on the point of completion, and which has for its purpose stone-dressing, or the working of stone mouldings. Various attempts have been made to supersede the primitive methods of working in stone. The inventors would seem to have worked upon wrong lines. Expensive steel cutters, made to the shape of the mouldings, were fitted to powerful machinery, and under them the stone to be worked was passed to and fro. As soon as they commenced action the tools were found to lose their cutting edge and grind out of shape, with the result that the moulding could not be formed. Observing the weakness of this complicated tool, Mr. Thomson set to work to devise a machine which would have a simple tool, and form the moulding by some independent motion that could not be affected by coming in contact with the stone. It was intended to operate upon the stone by a circular saw set with black diamonds, but Mr. Thomson has recently patented, and is experimenting with, a new and cheap tool formed of a novel composition. A circular thin saw, composed of this new material, will be guided in its movements by a cast-iron developing form, working in conjunction with suitable machinery, in such a manner that at the termination of each cut the saw is alternately moved or fed until the moulding is completely formed, thus mouldings of all sizes and characters are worked by one and the same saw or tool; and as one developing form produces mouldings of any size, only one simple cast-iron form is necessary for each distinct pattern or character of moulding. Again, there being practically no wear on those cast-iron developing forms, no matter how great a quantity of mouldings are worked, there will not be the slightest degree of variation. Another advantage obtained by forming all sizes from one development is, that the whole of the mouldings are increased or diminished in size to a true scale, and these developing forms may be set out so as to produce the various members of a moulding with care and precision. With such a machine,—which may appear more complicated in its description than it is in its reality,—there is the prospect of working stone on more economical and expeditious principles than have hitherto prevailed. There seems no reason why the example set by those engaged in the wood trade should not be followed out in masonry. With a little enterprise, and such a system of machinery as this set to work at the quarries, mouldings, door-porches, columns, &c., might be turned out and become staple articles of commerce, to be bought at the various local depôts of the companies who manufacture them, and sent thence to the building site.

THE TREDEGAR MEMORIAL EXCHANGE, NEWPORT.

ON the 4th inst. the Tredegar Memorial Corn and Metal Exchange, Newport (Mon.), was opened by the Duke of Beaufort. Previously to the death of the late Lord Tredegar it was proposed to build the Exchange, and formally present it to him, but on his lordship's death it was decided to erect the building as a memorial of the deceased nobleman. The design and style of the building are Italian. It comprises a clock-tower at the angle of the two streets, flanked in High-street by a loggia, affording entrance to the exchange-room. In the rear, beneath the exchange-room, are cellars, entered from Thomas-street, and the necessary offices for the use of the exchange. Above the exchange-room are three suites of office chambers containing seven rooms, which it is intended to let, and devote the income to the dispensary and other charitable institutions. The tower rises, in five stages, to a height of 76 ft., and the height of the end stage is broken by an entablature. The principal story has in the High-street front a bold hooded and moulded niche, with a projecting elliptical corbel, intended to receive a statue of the late Lord Tredegar, and beneath it is a black marble panel, incised with gold letters. The exchange-room is lofty, and may be described as being arcaded and pilastered on each side in five compartments with circular and moulded arches. The compartments on the left are filled in with Venetian windows. The end of the room is also arcaded with piers and pilasters, enriched with carved composite capitals and arches, the spandrels containing medallions with the crest of the Tredegar family and the date of the year in high relief. Above this are a fretwork frieze and moulded corona. The lower part of the room will be finished with a polished pitch-pine dado, with bold moulded surface, and the walls are of buff brickwork, with Bath stone caps, arches, and imposts. The ceiling is divided into panels by moulded pitch-pine beams carried on twenty scroll corbels of Bath stone, twelve of which are carved with fruits and flowers of the various months, four others represent the seasons, and the angle ones have heads of animals, representative of Agriculture and Hunting. The panels of the ceiling are enriched with medallions, alternately conventional and naturalesque, with fruits and flowers. A four-faced illuminated clock will be shortly placed in the tower, at the cost of the corporation.

The building was designed by Mr. Benjamin Lawrence, architect, Newport. The builder was Mr. Charles Miles. The cost is upwards of 4,000*l*.

THE NEW PALACE OF JUSTICE, VIENNA.

AMONGST the edifices of a monumental nature which are destined to make Vienna one of the most beautiful cities of the world, the new Palace of Justice (*Justizpalast*) occupies a most prominent position).* It concludes a long series of monuments of Austrian national art, of which two—the Academy of the Plastic Sciences and the Exchange—have already been delivered over to their occupants, and on which labour the most eminent architects of Vienna, and, it might almost be said, the whole brotherhood of art of the metropolis on the Danube. The design for the new Palace of Justice is by the architect Alexander von Wielemans, a young man, who by this work has leaped from comparative obscurity into prominence, by the side of such men as Semper, Hasenauer, Hansen, Schmidt, and Ferstel. Among the competitive designs, representing nearly all styles of architecture, that of Herr von Wielemans, a talented disciple of Herr Dombaumeister Schmidt, was selected; and as early as the autumn of 1874, the young architect was charged by the Ministry of Justice with the duties of superintending the erection of the important work. Building operations were begun in the spring of 1875, and in September, 1877, the principal façade was completed. At the present moment, the roof is on the greater portion of the building.

The new Palace of Justice, erected in the German Renaissance style, covers an area 358 ft. long and 256 ft. deep. It has been placed next to the new Houses of Parliament, with its principal façade to the Amaliengasse. The free space in front, as far as the Ringstrasse, as well as the space between the Palace of Justice and the Auersperg Palace, is to be laid out in ornamental grounds. Gardens 33 ft. wide will also run along the lateral façades towards the Volksgartenstrasse and the Reichsrathsplatz, so that the building will stand completely free. The palace is in four stories and elevated basement, and is to give accommodation to the Tribunal of Commerce, the Imperial Court for Civil Cases, the Appellate Court, and the Supreme Court of Justice, arranged in such a manner that the two first occupy basement, ground story, and mezzanine story; the two latter, the first and second stories.

The total height of the building is 82 ft. The great front, facing the Justizplatz, has four entrances and vestibules, adorned by columnar portals. The principal space in the interior of the building is the so-called Central Hall (see view), a court surrounded by arcades, and covered by a stained-glass ceiling; it contains the great staircase, and from it access to all the courts is obtained. In a niche at the top of the first flight of the staircase, adorned with columns and entablature, a figure of Justice, 10 ft. high, in white marble from Laas, and executed by the sculptor Pendl, will be placed. The arcades of the first story will be supported by columns of red granite, with bases and capitals of white marble. The principal vestibule in the great façade will contain twelve columns of Untersberg marble, with decorated pedestals. The columns of the portals are of grey Karst marble. The dressing of the basement is a brownish Oslop stone, that of the other stories is of Margaretha stone.

The principal façade, which will be adorned by artistic *motifs*, receives an imposing ornament in the form of a handsome pediment in the German Renaissance, which will contain in the tympanum a gigantic Austria, and be surmounted by a massive imperial coat of arms. The statue, in the *atelier* of the sculptor E. Helmer, is already near completion.

The same façade is flanked by two turrets (of iron, with metal sheathing), which rise to a total height of 154 ft. over the pavement. The centre block of the great façade contains in the first floor a large hall, reserved for solemn occasions, which is 39 ft. 6 in. high, 79 ft. long, and 36 ft. broad; this will receive along the walls a free row of columns and be covered with a rich barrel-vault.

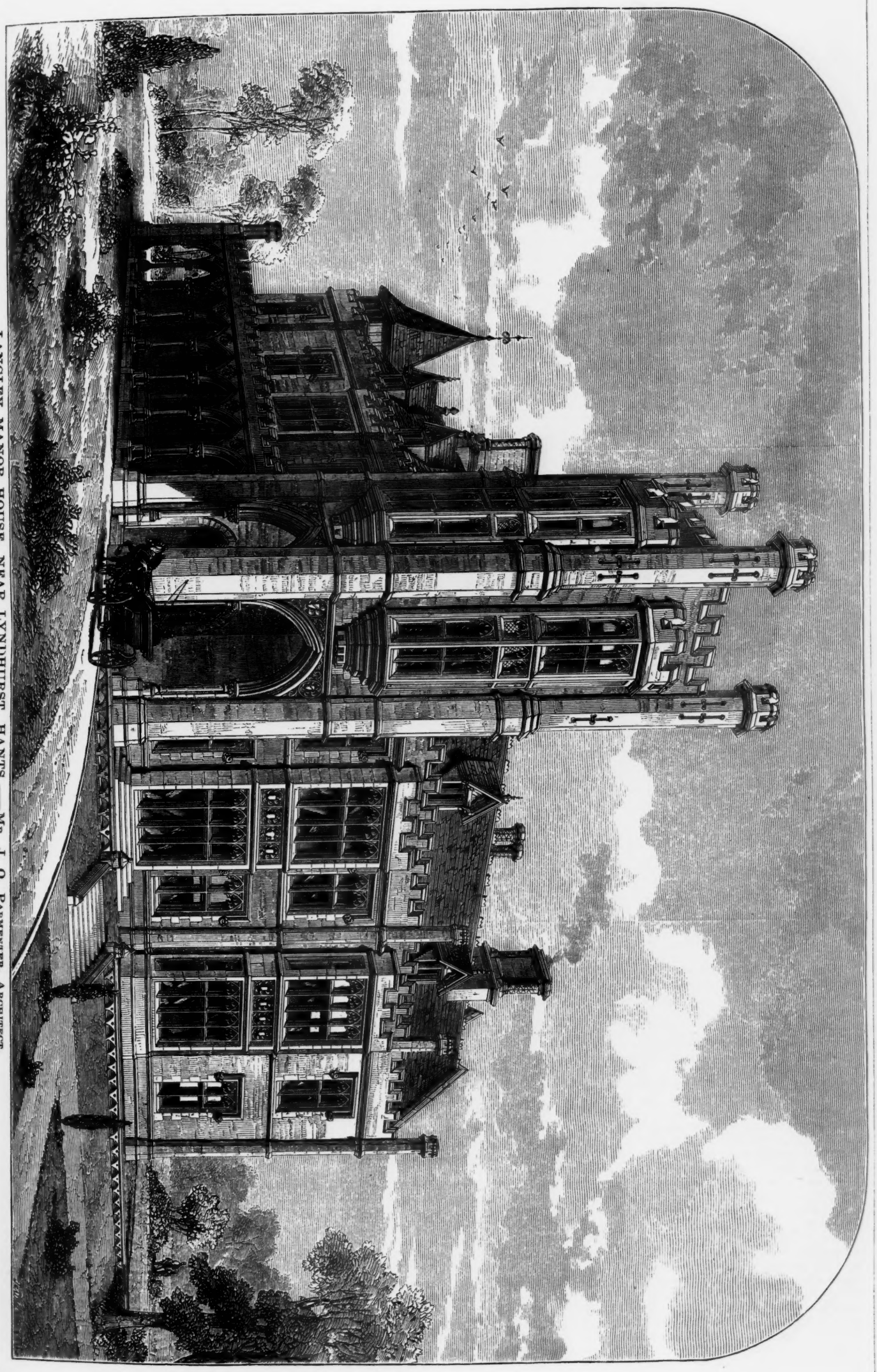
Great regard has been paid to practical utility in the arrangement of the building; and in its whole aspect, as well as in its decorative details, the new edifice will form an architectural ornament of the Austrian capital.

* See *Builder*, September 29, November 3, December 29, 1877, &c.

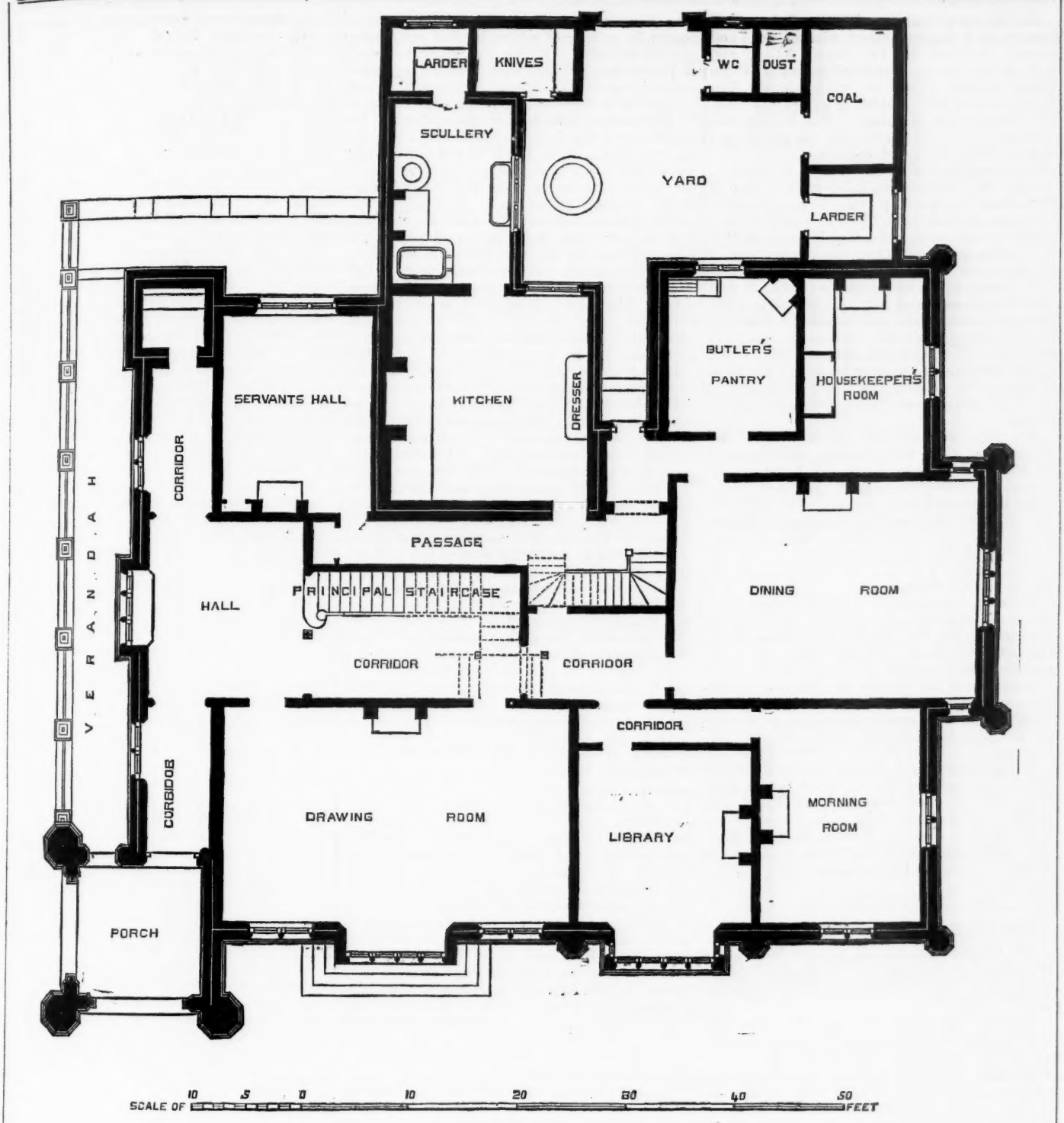
Assyrian Antiquities.—A correspondent writes:—"The authorities of the British Museum are exhibiting a praiseworthy desire to submit at the earliest possible moment to the inspection of the public the antiquities brought from Kalakh and Koyunjiy by Mr. Hormuzd Rassam. Already one moderately-sized case has been temporarily arranged in the most spacious of the Assyrian galleries, and others are to follow as soon as the preparations for that purpose have been completed. Nothing in the way of Assyrian or Babylonian archæology has for some years created so much stir amongst the learned and the public generally as the present collection of Mr. Rassam. The most attractive and important of all the specimens shown in the single case which has for two days been exposed to view are the singular and unique plates, belts, or scrolls of bronze, on which bas-reliefs record the military exploits and the more peaceful events of the reign of Assur-Nazir-Pal."

THE NEW PALACE OF JUSTICE, VIENNA: INTERIOR VIEW.——HERR VON WIELEMANS, ARCHITECT.

LANGLEY MANOR HOUSE, NEAR LYNDHURST, HANTS.——MR. J. O. PARMENTER, ARCHITECT.



LANGLEY MANOR HOUSE, NEAR LYNDHURST, HANTS.—MR. J. O. PARMETER, ARCHITECT.



LANGLEY MANOR HOUSE, HANTS.—PLAN OF GROUND FLOOR.

LANGLEY MANOR HOUSE, NEAR LYNDHURST, HANTS.

THIS mansion, built for Mr. William Vaudrey, was designed from sketches made by Mrs. Vaudrey, and has been carried out from the plans, and under the superintendence of Mr. J. O. Parmenter, architect, Kingsfield, Southampton, by Mr. H. J. Sanders, of that town. It is situated on a commanding eminence on the brow of a hill, from which extensive and picturesque views over the New Forest and surrounding country may be obtained, including the Southampton Water and the Isle of Wight. The elevations have been boldly and carefully designed in the style of the domestic architecture of the fifteenth century, manor-houses then partaking somewhat of the ecclesiastical and baronial styles of art, and the study has been to render all the parts harmonious one with another.

The external walls are built hollow, with red bricks and black mortar-joints. The jambs, mullions, transoms, sills, and cusped heads to the windows are executed in red Mansfield stone, as are also the bay-windows, oriels, arches, columns, and capitals. The plinths, copings, label mouldings, bosses, and strings are in red Alton stone, from the quarries in Staffordshire.

The entrance to the mansion is under the tower, which rises at the south-east angle of the building, and gives a striking appearance to the elevations forming an entrance-porch. It is paved with Minton's tiles, and has an ornamental pitch-pine ceiling, with brass and bronzed pendant for the lamp; under this ceiling is an Alton stone arcade with cusped-headed arches, and carved and moulded corbels, forming a rich cornice; on the floor above is the boudoir. There are two Mansfield stone moulded and cusped oriel windows, the floors of which are raised, forming recesses for seats, the walls are lined from floor to ceiling with moulded and carved panelling. Above this is the smoking-room, lighted by four large windows similar to the boudoir, with boarded walls and ceiling. On the top of the tower is a large provision for the storage of water, and these tanks are supplied by pumps from a well of 20 ft. in diameter. From the tanks pipes are distributed over the several floors, and connected with hydrants, &c., ready for any emergency in case of fire. Two other wells have been provided as a supply, and the water is conveyed through block tin encased pipes. Great attention is understood to have been paid to the drainage; all the drains are ventilated through charcoal, and most of the rooms are ventilated on Tobin's principle.

The building contains on the ground floor the entrance tower or porch; corridor, in which is placed a pair of carved, cusped, and moulded inner doors; hall, principal staircase, drawing-room, library, morning-room, dining-room, housekeeper's-room, butler's pantry, servants' hall, with a complete set of offices. The pointed arches in the hall and corridors are in Mansfield stone, the capitals are carved with conventional foliage; the walls have moulded and V-jointed dado with cornice, and the ceilings are painted, all the paving being of Minton's tiles. The drawing-room, which is 32 ft. long by 20 ft. wide, is bordered with Arrowsmith's solid parquet; the walls are lined with a carved and panelled dado out of American walnut wood, with cusped heads, carved strings, bosses, and cornice; these are touched in with gilding. The chimney-piece, from the architect's design, is of Mansfield stone, the former being fitted with a dog-grate made to design, with the family crests, &c., and the hearths and linings of the sides are of tiles.

The ceiling assimilates with the dado, and is panelled in a diagonal shape, with moulded and turned pendants, having carved foliage and fruit as enrichments placed between the panels. These are also picked out with gilding. The door is carved and moulded to match the dado. The fittings are of brass. The library and morning-rooms are fitted with parquetry, and have panelled dado and ceilings, the chimney-pieces being fitted with Feltham's dog-grates, to design. The dining-room, which is 28 ft. long by 20 ft. broad, has a solid parquet border, the walls having a panelled dado, filled in with V-jointed boarding, the cornice of which is battlemented. The ceiling is formed from the construction of the floor over it, the joists being wrought, and stop-chamfered, with massive wrought and stop-chamfered beams with hammer-beams; the latter are ornamented with shields for armorial bearings, and parts of the ceiling are picked out with gilt. The door and chimneypiece, which are in Mansfield stone, have been designed so as to form a feature with the dado, which here is panelled and carved, each panel forming a shield.

The bay mullioned hall windows are filled with stained glass, with heraldic bearings, and all the windows throughout are fitted with a wrought moulded iron interior margin.

All the bedrooms, which are lofty and well lighted, have a border of solid parquet, and are fitted with Mansfield stone chimney-pieces, fenders and dog-grates, with tile-hearths, and are all ventilated on the principal adduced by Dr. Arnott and Tobin.

The bath-rooms are fitted with the royal porcelain bath, moulded and glazed in one piece, as designed by his late Royal Highness the Prince Consort. All the table-moulds are carved, and terminate with grotesques or foliage. Some of the capitals of the arcade are cleverly carved. The roofs are covered with tiles made at Bishop's Waltham, with an ornamental ridge, while over all are the solid copper tape lightning conductors.

The stable range has the blue Staffordshire paving, the walls being of white bricks, lined with Minton's light blue tiles, and fitted with patent iron fittings. The carriage-houses are heated with hot water. The clock in the turret has been supplied by Frodsham, and strikes the hours, chiming the divisional parts.

THE HIGH-LEVEL BRIDGE QUESTION.

"The uses of mediocrity are for every-day life, and the uses of genius, amidst a thousand mistakes which mediocrity never commits, are to suggest and perpetuate ideas which raise the standard of the mediocre to a nobler level."—*Lord Lytton.*

SIR,—Having read your article of the 13th ult., on the proposed Tower Bridge, I forward to you the following remarks, containing a few facts and reasonings which I think have some claim to form part of that full inquiry and debate of the question which you agree is necessary to prevent the adoption of "poverty of invention disguised under the undeserved name of economy."

Allow me to introduce myself as a twenty years' amateur student of iron bridge architecture, who entertains very revolutionary ideas upon the subject. In a recent letter to Sir J. W. Bazalgette I have expressed the opinion that iron bridges are mostly "an abomination unto art." But as you have described them as "some of the ugliest structures ever erected on our planet," I trust you will not find fault with me for my unvarnished plain-speaking. Within the limits I know this letter must be confined to, I will not attempt even to sketch the skeleton, but merely a few bones ("of contention") of the subject, as follows:—

The first question I would ask is, Why has not the Metropolitan Board of Works called for a competition of designs for so great and important a structure as was done in the case of the Houses of Parliament, the Government Offices, the Nelson Monument, Law Courts, &c.? What is the difference of circumstances that has rendered a competition unnecessary in this case, though necessary in those instanced and many others? In the cases cited, excellence in architecture or art alone was requisite (except in a very minor degree). But in the unprecedented bridge in question, a masterpiece of science and architecture combined is the need of the occasion. If no individual architect or sculptor can be depended upon as being unsurpassable in the exhibition of one talent, upon what ground is it assumed and concluded that an individual engineer possesses two talents in a pre-eminent degree, in neither of which he has yet distinguished himself? If the Metropolitan Board of Works does not feel sure that its engineer possesses such extraordinary abilities, it is not justified in recommending his plan for adoption by Parliament, untested by competition. No committee of the House of Commons, I believe, has ever taken upon itself to act so narrowly and exclusively in a matter so important. And the most to be learnt from this Tower Bridge project appears to me to be that the Metropolitan Board of Works has been set upon too high a horse, and is in danger of riding too far; and that its business functions require to be not unlimited, but as clearly defined and circumscribed as to its geographical operations. The effect of allowing a Commission to spend public money by the million upon whatever it pleases that happens to come up to its notions, and be first presented to it, and not enforcing comparison and examination, must be to stifle art and improvement in all such great public structures as are placed under such commission's control. Thoughts and art creations are each born of one person, not of committees. All the Royal Commission of 1850, and scores of architects and engineers, could not create the Exhibition building of 1851; but one Paxton could. A committee's ideas are necessarily mediocre (and unfit for uncommon purposes), unassisted with means of comparison. The people of a village who had never seen or heard of any other kind of lighting than candles would regard "wax-moulds" as the acme of the art of artificial illumination. Emerson says, "It is in the soul that architecture exists. Santa Croce and the dome of St. Peter's are lame copies after a divine model. Strasburg Cathedral is a material counterpart of the soul of Erwin Steinbach." If the Metropolitan Board of Works had power to build a metropolitan cathedral, would it give the job to its chief drainage engineer and shut its door in the faces of Erwin Steinbachs and Christopher Wrens? I contend that if the Metropolitan Board of Works had such power, and were so to exercise it, it would be acting on the same principle, and in no worse manner than it is doing now. A great bridge, I submit, is as sacred a work as a great church. Both are sublime tasks, and equally entitled to the consecration of a human mind in their production. Why may not an arch or span of a thousand feet (if there is any grace in its form) lead to reverence of the fountain of intellectual power as effectually as a 500 ft. spire? Is "the pure wine of imagination" to be devoted to the latter, and common mental beer deemed good enough for the former? Is it wise or defensible to pursue any work of art with only one of our several shutters open, and in all probability produce a lamer model than we might, through wilful lack of light. The Metropolitan Board of Works was established to overrule and control the petty plans of local commissions of sewers, who I believe sometimes managed to swamp each other's districts. But shall we not get rid of that mischief by creating another as bad, if we permit the said Board to swamp some of the highest forms of intellectual energy of the whole country in an ever-present flood of monopoly? National fame is at stake in the decision. A great metropolitan bridge is no more a mere metropolitan question than Spital-fields drainage is a mere Spital-fields question. "British interests" require watching and guarding in the choice of a public structure as carefully as in a European congress. I submit, then, that a public competition, or a good reason why there should not be one, is the first point that should be debated.

I shall not discuss the question of the necessity of a bridge in the proposed locality. There is, I think, a balance of evidence in its favour (as well as the approbation of the Metropolitan Board of Works), *if it can be so made as to accomplish its purpose.* I shall go no further in this letter than criticise Sir J. W. Bazalgette's plan of the southern approach, and offer for consideration another plan as an amendment upon it. I cannot reconcile the published statements and certain provable facts respecting the plan of the southern approach. Sir J. W. Bazalgette said (March 22):—"The southern approach would commence in Tooley-street, east of Queen Elizabeth's Grammar School, and would rise by taking one turn and a half round a spiral curve about 300 ft. in diameter at the back of the Anchor Brewery, and thence on to the bridge at Hartley's Wharf." It is not quite clear where the approach is to commence, for Tooley-street terminates considerably westward of the Grammar School. But I suppose Sir J. W. Bazalgette means in Queen Elizabeth-street. The illustration of the Tower Bridge in the *Graphic* (April 13) presents a level soffit throughout the length. Assuming the depth of platform to be 5 ft. (it is at least 8 ft. as drawn), the surface of road at the abutment would be 70 ft. above high-water mark. Queen Elizabeth-street is not more than 5 ft. above high-water mark, so that the rise would be 65 ft. The *Graphic* says the incline is 1 in 40. Mr. Hanson said, at the Common Council (May 2), that the "spiral road was 714 yards long. The distance from Queen Elizabeth-street to the side of the water is less than 500 ft. It is evident that either the statement that the incline is only 1 in 40, or that the spiral curve would be about 300 ft. in diameter, must be greatly wrong. If the incline is 1 in 40, and the rise 65 ft., the diameter would be 550 ft. (60 ft. or 70 ft. more than the whole space between Queen Elizabeth-street and the Thames), and the length of the road would be 2,600 ft., or 866 yards 2 ft. If the incline or gradient is 1 in 40, and the length of the spiral road (as Mr. Hanson says) is 714 yards, the diameter would be about 454 ft.,—nearly all the distance between the Thames and Queen Elizabeth-street. And I may here observe that the space from the front of the houses on the north side of Queen Elizabeth-street to "the back of the Anchor Brewery" premises is certainly less than 240 ft. I reckon that a circle and a half of 33 (allowing a trifle for slope) has a diameter of 7. And if the spiral curve would, as Sir J. W. Bazalgette states, be 300 ft. diameter, its length would be 1,414$\frac{2}{7}$ ft. And if the gradient was 1 in 40, the rise of the road would be only 35$\frac{14}{40}$ ft. Now I want to know where the other 25 ft. or 30 ft. are to come from. Suppose we say that the top of the spiral road is only level with the soffit of the central part of the bridge, and that Queen Elizabeth-street is more than 7 ft. above high-water mark, we should then require 57 ft. of depth in the spiral road, which, if the diameter was 300 ft. would give an incline of full 1 in 25. In these calculations I have only given the minimum rate of incline at the outside edge of a spiral road; at the inner side the steepness would be from 15 to 20 per cent. sharper. In the last supposed case (if the carriage-road were 36 ft. wide) the incline at the inner edge would be 1 in 19; and if the depth were 65 ft.,—1 in 16$\frac{1}{2}$. Surely such wide discrepancies and seeming contradictions require clearing up by a consistent statement of something approaching to exact details.

Now let us look at the gist of this southern approach part of the question. No doubt a foot-bridge (with stairs) would be very useful, but a quarter of a million would cover that; but before the million or more is laid out, there ought to be good evidence that the money would not be wasted. Experience of the avoidance of Southwark Bridge should teach caution. In recommending, without more inquiry and knowledge of the subject than it at present possesses, the plan of Sir J. Bazalgette to the House of Commons for adoption, I think the Metropolitan Board of Works has shown too much confidence in its own prescience. It must be composed of wonderful men, if they can safely dispense with experiments in great undertakings involving largely new conditions. Many thousands of pounds were spent in experiments before such eminent engineers as the late R. Stephenson and Sir W. Fairbairn proceeded to the construction of the Britannia Tubular Bridge. If a spiral road of the proposed full dimensions does not exist anywhere in the country available for experimenting, I submit that common prudence demands that a central section of about 8 ft. of the intended spiral roadway should be erected (in timber) in one of the parks, and paved the same way as the intended spiral road, and tested in all kinds of weather by all kinds of full-loaded carriages and vehicles, and the strain upon horses tried. That would be the only way to *know* really the time saved, and (taking the vote of metropolitan horse-owners) the merits of the said spiral road. We must remember that no clear comparison can be drawn between a straight hill and a curved hill of the same height. In the latter horses abreast must to some extent pull at different angles and against each other, while the load can never be fairly in line behind either. The spiral road in West Smithfield has been mentioned, but it should be noticed that it is not much, if any, more than one-third of the height of the proposed road at Horselydown; and it will not do to calculate by

simple multiplication the time and strain in the two cases, any more than to conclude that if a horse could run a mile in three minutes, it could run three miles in nine minutes. The cost of such experimental road would, I should think, not exceed 3,000*l*. Would it not be better to spend that sum and make sure, than risk throwing away more than a hundred times the amount? For the reason above stated, I greatly doubt the utility of any spiral road at the *locus in quo*, and I therefore suggest the consideration of meeting the difficulty by a steam-lift (toll-free). Probably a steam-lift, site, station, and approach would cost half a million less than a spiral road, site, and approach; and I think that half a million (most of it reckoned as invested, which it need not be) would suffice to "make and maintain" a lift service, that would rise and lower (six to each lift) 240 carriages per hour, besides cattle and sheep, &c. Taking in the twelve busiest hours, 5,760 of the 12,000 vehicles stated to pass through Eastcheap, Gracechurch and Thames streets "daily,"—whatever number of hours "daily" may mean,—I believe it would be found that the steam-lift would be quite as quick as well as cheap as the "spiral curve," with all the labour of ascent and descent saved. 20*l*. for fuel, and 30*l*. for other expenses per day, I reckon, would not be exceeded. Other details I deem here unnecessary. Believing in it myself as the best plan under the circumstances, I offer this suggestion as a fit and proper one for investigation before a final decision is arrived at.

I have to apologise for not justifying the heading of this letter by any remarks upon the bridge itself. But I felt bound to draw attention in the first place to the two subjects I have introduced; they appear to me to be the due and necessary A and B of the matter.

If this communication be favoured with your insertion I purpose to proceed in my next to the question,—"Is the art and science of wrought iron (including steel) combination in relation to bridges in a crude and unsatisfactory state?" taking the affirmative. Sir J. Bazalgette's proposed Tower Bridge is confessedly only a redish-up of old arrangements, and I submit that the present occasion is a seasonable time to overhaul the whole subject of the state of the art of combination of the metals named, for bridge purposes. I will just observe in conclusion that there is an assumption in connexion with this steel bridge proposition, which has been purveyed and swallowed without notice. It is a generally accepted idea that existing wrought-iron bridges represent all the strength of the material they contain, and that to get more strength without increase of weight and quantity, steel must be resorted to. Such idea I think I can show is a gross fallacy, refutable by Fairbairn's own pages. But I do not, however, propose to use iron (mainly) for bridges in this or any case where weight and bulk are an object to save, but to show that neither the strength of wrought-iron nor that of steel is or can be fully developed by the present riveted plate system of combination.

C. G.

WORKS FROM JAPAN.

SIR,—I have recently received from the Government of Japan a most valuable present in the form of models of some of the ceilings of the great temples of Tokio, and also some wonderful old nails from temple gates, which are a present from the chief of the Museum in Jeddo. The ceilings are divided into square panels, which panels are treated in various ways. The most simple and, to my thinking, the most beautiful, is said to be a copy of a Corean ceiling; and when in Japan I was often astonished to hear that beautiful works were mere copies of objects in the Corea.

Thinking that it might interest your readers, I send you the following copies of the two kind letters which accompanied these valuable gifts:—

"26th of 3rd Month, 11th Year Meiji.

DR. DRESSER,—Sir: In January of last 10th year Meiji you have brought the articles sent by Mr. Owen to our Museum, and I am much obliged that you have taken the trouble to arrange them. After your returning home last April, the articles have been exhibited to all the people, and I have notified all through the country your valuable informations regarding to the important points of industry which you have given to the officer who attended you during your visit to several industrial establishments. It must be for your kindness that I could make all industrial men to understand the points which were obscure heretofore, and I can assure you that in the future time they will make a progress and bring great interest upon the commerce.

During your visit you have requested our Museum to make the models of ornamental ceiling of several temples at Tokio, and now they have been finished.

Although they are very trifling, and not enough to compensate your last service, I present them to you. You will please accept them as the token of my highest regard. With compliments.

OKUBO TOSHIMICHI,
Minister of Interior Department."

"26th of 3rd Month, 11th Year Meiji.

Sir,—During your travelling through our country last year, I have had the honour to see you at Nara in the time of my official visit to that place, and soon you have departed this place, before I could get the occasion to behave friendly toward you. While I feel great regret, it has passed one year already, and now I will take the pleasure to write and to express my earnestness to you and ask your health.

The articles which you have taken the trouble to arrange at our Museum, and which were presented by various English manufacturers, have attracted much attention of our people, and have got great renown to our Museum, among others the porcelain-makers at Kanadzawa, Kaga, asked to copy some in order to make the models of design and colour.

I have never forgotten your valuable information which you have given Mr. Sano: so I have not permitted these men to imitate them, but, regarding to the design and colour, as our artists are yet far from being equal, I believe you will allow that it is one of our industrial improvements to take the excellent parts of your design and colour without imitating their whole forms and figures.

During your visit to Tokio you have requested to make the models of ceilings of existing temples at Shiba and Uyeno, and now they, being finished, are presented to you from our Minister of Interior.

And I present two ornamental coverings of nail-head used in Rashōmon and Congōshuin, and twenty-one old irons to you, one iron cylinder of which is presented by Mr. Suge Sōho, a subordinate, who have seen you at Nara. You will please accept them. These ornamental coverings and irons are, as you know, things used in our ancient buildings, and their particulars are to be found in the information herewith annexed, so here understood.

Mr. Tanaka Joshio, second secretary of Interior, and Mr. Shioda Makoto, attaché of Interior, who were acting for me, told me that they ought write to you, but as I am writing to you they request to me to avail themselves of it, and to express their thanks to you; also, Mr. Shiodo requests to present fifty patterns of plastered wall to you. These patterns show the plasting condition of walls in our buildings, and he ask that they will be of a little interest to your architects.

In conclusion, after your receiving my letter, you will please inform my sincere thanks to Mr. Philip C. Owen, Messrs. Londos & Co., and other manufacturers.

MACHIDA HISANARI,
First Secretary of Interior and Chief of Museum."

The first letter is from Mr. Okubô, who was dragged from his carriage and brutally assassinated on the 14th of May last, while on his way to a cabinet council at the Mikado's palace. He was a gentleman of the modern school, and earnestly sought the advancement of his people.

In the second letter, reference is made to nail-heads. Those who have visited Spain well know that many of the cathedral doors are studded with large nails of Moorish origin, many of which are highly ornamental in character. The Japanese nails, to which reference is made, are very similar to those of the Moors, and prior to my visit to Japan I should have mistaken these nails for Moorish works.

I was surprised to find in many Buddhist temples in Japan a lamp in common use, which is identical with the particular lamp used in the Jewish synagogues in Morocco, but here I have been tempted to enter upon a field of inquiry, which has no relation to the letters of which I send you copies; but the coincidence in form of nails and lamps in countries so distant is worthy of special note, and these are only two instances out of many that I observed during my travels in the interior of Japan and in China.

CHR. DRESSER.

THE TRADE-UNIONS CONGRESS AT BRISTOL.

THE eleventh annual congress of representatives of the various trade unions of the country was commenced at Bristol on Monday.

Mr. Bailey (president), chairman of the Parliamentary committee, presided at the sitting of the congress, and said that, taking into consideration the depression of trade in all branches of industry during the past year, and the struggle which had taken place in various industries in connexion with trade unionism, he thought the attendance at the assembly showed that the working men of the country had every confidence in the usefulness and benefits of unionism. Though they had sustained defeats in Lancashire, London, Northumberland, and other places, they had not become wholly demoralised, but retained a nucleus by which they could improve their position at no distant period and become as strong as ever they had been in the past. They had now to contend with a strong federation of employers, and he thought the day was not far distant when they, as trade unionists, would have to extend their lines and have a strong federation, instead of existing simply as isolated societies.

Mr. G. F. Jones, secretary of the Bristol Trades Council, was elected president; Mr. Kennedy, of the United Trades Council, vice-president; Mr. J. F. Hopkins, secretary; Mr. John Burnett, London, secretary of the engineers, treasurer; and Mr. Fitzpatrick (Liverpool) and Mr. Caunt (Bristol), auditors of the congress.

The Standing Orders Committee having been elected and some minor officers appointed, Mr. Jones assumed the office of president.

Mr. Broadhurst (London), secretary of the Parliamentary Committee, presented the report of that committee, which congratulated the Congress on the progress made during the past year with the Employers' Liability for Injuries Bill. Although there was no actual legislative gain to report, the question had made enormous strides in the amount of public attention it had attracted, and public opinion had undergone a remarkable change in relation to it. The Attorney-General had promised to introduce a Bill on the subject of employers' liability, but although Mr. Macdonald had constantly pressed the Government to introduce a Bill, nothing more had been heard of it. The associated employers were offering a most fierce opposition to any Government action on the question, and the committee had been informed that a large deputation had an interview with the Attorney-General, urging him not to proceed with the Bill. Whether the Attorney-General intended to comply with their wishes or not, it was only too evident that the workmen would have to throw their whole influence into the agitation, or no legislation would be obtained. The report next referred to the passing of the Factory and Workshop Act, in which some important modifications were conceded by the Home Secretary; but on the whole the Act contained all the important principles of the Bill in its original draft. The committee, remarking upon the general position of trade unions, stated that the past year had been one of great depression in nearly every branch of productive industry. The want of employment had not been peculiar to Great Britain; other countries had suffered much more severely in that respect than our own. Reports from America and the Continent all testified to the prostration of trade throughout the world. The present year had witnessed the close of two remarkable disputes in the building trade,—the masons of London and the joiners of Manchester. In both cases the men were supported by powerful unions, with large accumulated funds, and great resources in the power of levying for extra support, but they regretted to say that in both cases the men failed to establish their demands. That might be accounted for in many ways. First, although the building trades in Manchester and London were in a prosperous state at the commencement of the disputes, yet under the power of the strike clauses now inserted in all contracts, the employers are enabled to postpone the completion of the works to an indefinite period. Second, the sympathies of nearly all classes of people, except the workers, are on the side of capital, without regard to the special point in dispute. This applies more especially to local corporations and other governing bodies. Third, the employers in nearly all branches of industry are now united in powerful organisation. This form of united action they have undoubtedly copied from our own unions. This almost unlimited concentration of authority gives them a power of offence and resistance hardly equalled by our best unions. Fourth, the collapse of American industries and Continental works has flooded the labour market with skilled hands of all trades. The superfluous wealth of English employers enabled them to import this labour into England, not from motives of economy, but from a determination to defeat the workmen's combinations, even though it should entail a greater outlay of money than would have satisfied the requirements of native workpeople. The English unions (says the report) are thus brought face to face with a most wealthy, most unscrupulous, and skilfully organised opposition, a power not directed by the open form of government known to our unions, but for the most part working in secret and shunning the light of day. Its deliberations are conducted in private, and its edicts go forth in strictly private and confidential circulars. Its victims are struck by unknown hands. The greatest offence known to these secret associations is membership of a

trade union. The highly skilled and industrious workman is punished equally with the worthless should he be determined to exercise his birthright of association with his fellow-worker. The committee observed that it was not their duty to point out the means of dealing with those new elements in industrial conflicts; but they ventured to warn the unions that in order to meet that new condition of things their societies must be placed on the soundest foundations. The directing authority, which was now so scattered as to be almost useless, must be concentrated. Organisation was fast becoming a science requiring experienced statesmanship. To successfully conduct them, the revenues of the unions must be enlarged and their area of influence must be considerably extended. Nobody more earnestly regretted the ever-recurring conflict between capital and labour than the committee, but it nevertheless ventured to warn the employers that the stamping-out process would not succeed. Unionism was too firmly rooted in our soil to be destroyed by capital, however powerful and insidious its opposition might be. Workmen only asked for the wages necessary to maintain their homes, and to meet the constantly increasing demands of taxation. To secure that, they believed combination to be as necessary now as it had ever been, and they had no hesitation in saying that the unions had a future before them immeasurably greater, more powerful, and more successful than their past.

We shall return to the proceedings of the Congress.

"CONCRETE HOUSES."

SIR,—With your permission I shall be glad to give your correspondent "G. G." the information asked by his letter in your last issue.

There is no doubt of the practicability of constructing the proposed houses on the Duke of Sutherland's estates entirely of concrete, including walls, floors, stairs, and roofs. Neither is there any doubt, if "rightly directed," of the economy (especially in a district where clean sand and gravel are plentiful, and skilled labour scarce) and other advantages, such as dryness, warmth, being fireproof, durable, and, especially as regards the roofs, less liability to need repairs.

Ample proof already exists in the North of Scotland of these advantages of concrete building. Five or six years ago my firm built walls floors, and stairs of the Aberdeen Theatre in concrete, and a present examination will show how good and valuable a material concrete is for such uses.

I have built also in Aberdeen the new Epidemic Hospital, cottages at Torry, new slaughter-houses for the Flesher Incorporation, and other buildings, and mention these that "G. G." or his agents may have the opportunity to satisfy themselves by personal examination.

No example, that I am aware of, exists in Scotland of the best form of concrete roof, the domed concrete roof of the Arlington-street Swimming Baths, Glasgow, being the best of the concrete roofs I have executed in Scotland. Many flat concrete roofs have been built, but I prefer to make them curved, like rather flat arches; then, getting the advantage of the tensile, as well as the compressive strength of Portland cement, these curved roofs may be made thinner than flat ones, giving the walls less weight to carry, and even less thrust or lateral pressure to resist, and giving also all better form for throwing off rain and snow. Gutters are formed on the top, no iron or other gutters are required, and there will be no broken slates or tiles; and, when properly executed, no other repairs whatever.

Such a roof may be seen at our new building in Wandle-road, Wandsworth-common, near London. The same building will also show how colour and other effective finish may be obtained cheaply, and the ordinary "stucco" avoided.

CHARLES DRAKE.

SIR,—There can be no doubt that on landed estates, the many advantages possessed by concrete can be realised to a greater extent than in many other places. The principal materials, either gravel, stone-chippings, broken flints, burnt clay, or some like substances, are usually procurable without any outlay on the part of the landowner beyond the labour in digging or collecting, and in many cases the cost of removing *débris* from old buildings is avoided by re-using it as an aggregate in concrete construction.

As unskilled workmen only are necessary (but with proper supervision), facilities are afforded for employing agricultural labourers at times when they would have but little else to do, and they are preferable as a rule to ordinary town labourers for this kind of work.

The present price of iron, and facilities for obtaining it of almost any size and section, enable iron and concrete floors to be constructed at about the same price as with wood in the ordinary way; but for roofs of cottages and farm-buildings, there are many objections to its general adoption. The numerous requirements in erecting labourers' cottages and farmsteads, such as water-troughs, tanks, ponds, pavings, copings, cills, &c., render concrete almost invaluable when once its general usefulness is appreciated.

I make these remarks from the experience gained in having erected during the last ten years a very large number of buildings in concrete on Lord Ashburton's estates without any failure of consequence that I am aware of.

THOMAS POTTER.

SIR,—Referring to the letter from "G. G." in your issue of August 31st, I beg, through your columns, to invite his careful attention to the article in your paper of September 8th, 1877, of Concrete Building according to the system of Mr. Edge, of Birmingham, in which the subject is fully treated and explained.

Q. E. D.

ON SHAMS.

SIR,—That flimsy piece of bunting on which "Down with Shams" is inscribed is so often flaunted in one's face, as if it were the Royal Standard of art, that the sooner it is torn to shreds and tatters, and converted into tinder, the better. All who enrol themselves under this cotton rag are so sensitively conscientious that they are constantly expressing their abhorence of art-fibbing, as if art in its legitimate "shamming" were guilty of atrocious lying. This sensitiveness is only paralleled by that reported of some of our American cousins, who are so easily shocked that they clothe table-legs in "continuations." The followers of this flag, or, rather, rag, "which has *not* braved a thousand years the battle and the breeze," are unable to discriminate between the moral delinquency of a nefarious purpose, of an intent to defraud with *mal prepense*, and the legitimate shamming of art, whose very province is, and was, as it were, to hold the mirror up to nature, to imitate, to counterfeit, with paint, with marble, with voice, and gesture. Surely these are not the things themselves, but "shams," or counterfeit presentments of them; and in the higher kind of art, as I took care in a former letter emphatically to express it, this shamming must be done not *too* well or closely, but *wisely*. It must be done within certain limitations. We must in this shamming, as the poet expresses it, "beget a temperance."

Is it not curious to contemplate, however, that that numerous following of painters of the present day, self-styled "realists," and which vociferates the loudest against "shams," is yet bound, in obedience to its fundamental tenet, to "sham" nature with all its might, to carry nature—"shamming" to its greatest lengths? The Dutch excelled in this closely imitative painting, and have been duly admired for it, and one Quintin Matsys, of Antwerp, had the villainous and "lying" audacity to "deceive the expectation" of an innocent burgomaster, and what is worse, of his future father-in-law, by "shamming" a bluebottle to such an entomological nicety, that the "expectation-deceived" burgomaster sought to sweep it off the canvas. It is, we believe, this very fact which has placed the painter of Antwerp in English estimation before Michelangelo and Raffaelle, and which has given such formidable and full-blown sanction to the realistic school in this country.

But if "shamming" is to be done *wisely* in the higher art, there is a kind of art in which "shamming" *de rigueur*, as we have already instanced, has been countenanced, nay esteemed, more especially in "still life," copies of bas-reliefs, and in the imitation of woods, marbles, &c. If anybody's "expectation is deceived," anybody is cheated, by this innocent "shamming," these artistic fibbings, or white lies, the success may be forgiven. Such "shammings" have, indeed, not only been forgiven, but accounted merits, from the time of Matsys to the present day.

Is Nature herself, however, free from the imputation of "shamming"? Let us see,—why, at the very outset we are confronted by the fact that man's "expectation is deceived" into believing that he sees the things themselves whilst all that he really knows of them are the impressions which they make upon his senses, the shams which Nature foists upon him. We have never seen Nature herself; we do not know what she is really like, and if we push reflection to extremities, we must conclude that we have never seen anything but ourselves. Our "expectation is deceived" into thinking that light is in the outer world, when it is light only in our own consciousness; externally it is simply vibration, and the same may be said of sound. What shall we say, too, to Nature's "lying," "shamming" mirage by ocean and by desert, "deceiving the expectation" of the traveller, or of other of Nature's "shams" which lure men to ruin? Or what to Nature's "lying" looking-glass, which shams so closely, so literally, which Shakspeare chose to be the image of the province of art? Or to Nature's insects, which develop into the shapes and lines of leaves with the purpose of "deceiving the expectation" of some other of Nature's creatures. Where, oh where does all that which the poor "supersensuous" art critics tell us is *not nature* reside? In a world outside this? or does Nature include the right and the wrong, everything that is possible to be, in the great All? The latter, of course. "Shamming" is therefore one of Nature's faculties, one of the delectations provided for our brief entertainment.

Again, descending to lesser things, shall we condemn Wren to the bottomless crypt of architects for placing a "sham" dome in St. Paul's, or the monkish architects who created that "shamming," "lying" Gothic, which trickles up to vault and clearstory, "deceiving expectation," but which does not utterly collapse, simply because those sly buttresses outside are propping it up. Or what of "sham" wings to angels, of "lying" centaurs, hypogrifs, and all the nondescript paraphernalia of art? Or what of "lying" dramas, novels, fairy tales, &c.? Or, yet again, of "lying" pictures representing events as they never occurred, and in inferior art as they never could occur? And, finally, what shall we say of all that "lying" early and imperfect art which far from "shamming wisely" could not sham well enough? Yet this, according to some people's logic, should give early art the precedence of maturer.

So far from industrial progress having diminished, it has prodigiously increased the production of "shams." The electrotype process has enabled people of moderate means to rejoice in the presence of seeming gold and silver surroundings. And compositions of various kinds are used to multiply articles of taste at a small cost. If these be well designed they are intrinsically, as matters of taste, as good as if they were made of solid gold or silver. The eye receives no more than the superficial value of the precious metals when they are solid, the great mass of costliness is buried beneath that. A false value is attached to gold and silver on account of their scarcity. Iron and copper have a much greater real value. If gold were as abundant as these it would be regarded as mere "yellow dirt." It is only when veneer is used to display egregious taste, vulgar forms, that the "sham" becomes reprehensible, and that we associate it with the *entourage* of "shoddy." In the worship of real gold, and in the display of false taste, we alike see that there is an inability to appreciate what is actually the real and intrinsic in life.

"'Tis true, and pity 'tis 'tis true," that with all our art-treasures, with all the patent processes for developing art, we should have to re-write the art-catechism,—but so it is. We may bring the art-collections of the world to our doors, but if common sense is not at home art must lie outside the understanding. Fine-art requires deeper thought than this present age seems able to give it; we are only dinned with superficial twaddle. Let us hear no more about "shams," unless that be of the laws of shamming wisely, which after all is but another title for the principles of art.

METER.

Kew Gardens.—Sir J. D. Hooker, in a report on the progress and condition of Kew Gardens during 1877, states that his experience of the management and working of the Royal Gardens, extending over upwards of thirty years, led him unhesitatingly to the belief that neither the collection nor the grounds could be maintained up to their present standard if the public were to be admitted in the mornings.

WORKS AT THE SCHOOL FOR THE BLIND.

THE School for the Blind in St. George's Circus and the Lambeth-road, is at present undergoing very extensive restorations and repairs, both externally and internally. The window-dressings, copings, and other main features of the several frontages, have for some time been in a very decayed condition, and it has at length been deemed advisable to re-face the entire building. The renewals are being executed in Portland cement, and the brick-work, which forms the main face of the elevations, will be cleaned and pointed. Mr. Drew, of Queen Anne's Gate, is the architect, and Messrs. George Baker & Sons, of Stangate, the contractors.

The interior of the building is also being renovated and decorated throughout.

A WELL-EARNED TESTIMONIAL.

ON the 4th inst. a meeting was held in the Cutlers' Hall, Sheffield, to present to Mr. W. Bragge, F.S.A., his portrait and an illuminated address on the occasion of his leaving the town, to take up his residence in Birmingham. The desirability of in some measure recognising the very valuable services Mr. Bragge had rendered to the town was first discussed at a meeting of the Council of the School of Art, held in May, 1877. Subsequently a meeting of the Council of the Free Library and Museum Committee of the Town Council, of the Council of the Literary and Philosophical Society, and other gentlemen, was called, and it was then decided to open a subscription for the purpose of presenting to Mr. Bragge his portrait. The commission to paint the portrait was given to Mr. R. Smith.

Mr. M. Hadfield was voted to the chair.

In the picture Mr. Bragge is seated in his library at Shirle-hill, and a portion of his famous collection of books forms the background of the picture.

The address is illuminated on four pages of vellum, executed in the early Italian style of illumination by W. A. Nodder, of Howard-road, Walkley. The arms of the Cutlers' Company are emblazoned on the right hand side of the border of the page commencing the address; the arms of the town of Sheffield are on the left side; and the arms of Mr. Bragge in the centre, at the top of the border. The first page contains a photo of the painting, enclosed in a gold ornamental border. The address is engrossed in old English, and includes this paragraph:—

"It is in the realm of Science and Art that we especially recognise the benefits which have accrued to our town by your painstaking exertions. The Museum at Weston Park, now an accomplished fact, owes its existence to your endeavours, while its contents bear repeated evidence of your generosity. And the School of Art, of whose Council you long were an esteemed member, and over whose deliberations you for three years presided, testifies to your efforts for the upholding and development of the highest art, and for the education of the rising generation of the artisans of Sheffield."

Several pleasant speeches were delivered, and Mr. Bragge made a capital address in reply. The portrait is to be placed in the Cutlers' Hall.

"HINTS FOR LIVERPOOL."

SIR,—The letter under the above title in your impression of the 24th ult. is not quite accurate in its statements. We are not altogether such Vandals as are there represented. Allow me in a few words to correct an evident misimpression. St. John's Churchyard is undoubtedly "a disused graveyard." Whether it is hideous or not is a matter of taste. It is certainly not "an absolute desert of sand," for the simple reason that it is almost entirely paved with flat gravestones. Tufts of weeds and grass there may be, but the writer omits to state that round the churchyard there has been planted a row of trees, which, though young, are flourishing and vigorous. That further improvements have not been carried out is not the fault of the Corporation, who have had plans prepared for the planting and decoration of the disused churchyard, and are prepared to pay the expenses, but have hitherto been prevented by the opposition of the ecclesiastical authorities. By the permission of the incumbent the churchyard was for a time thrown open preparatory to its general decoration, but it was closed again by order of the bishop. St. Peter's Churchyard, a large area in the very centre of the town, was also proposed to be planted and ornamented, but the assent of the rector was limited to a narrow pathway leading up to the church-door to be fenced off by iron rails. Under these circumstances we can only wait for the advent of better sense to "our bishops and curates and all committed to their charge."

One further inaccuracy I may notice. The writer states that St. John's churchyard "is surrounded on the south and west by a brick wall, and on the north, facing the museum, by a wall adorned with pilasters." This is not so. On the north and west sides the level of the churchyard is considerably above the street, requiring retaining walls which are of handsome ashlar stone, surmounted above the level of the churchyard by an open stone balustrade with turned balusters. The south side only has a wall, which is of ashlar stone, now somewhat dilapidated.

J. A. P.

Liverpool.

THE FALKLAND MEMORIAL.

ON Monday last the Earl of Carnarvon unveiled, with Masonic honours, a memorial which has been erected on Wash Common, Newbury (an elevated tract of ground to the south of the town, and the site of the battle between the army of Charles I. and the Parliamentarian forces) to Lucius Cary, Viscount Falkland. To Mr. Walter Money, F.S.A., a leading member of the Newbury District Field Club, belongs the credit of suggesting a memorial such as that which now marks the scene of one of the most sanguinary of the struggles between Charles I. and the Parliamentarians. The site, which is within a few yards of the spot where Lord Falkland fell, was given by Mr. Walter Money, who has with great energy discharged the duties of hon. secretary to the committee; and liberal contributions were made by Lord Carnarvon and others towards the cost of the monument. The design of Mr. James Money, architect, Newbury, was accepted; and Messrs. W. & J. R. Freeman, of Westminster and Penryn, took the contract, which they have satisfactorily carried out. The memorial is erected entirely in Cornish granite, the base being formed of a series of rock-faced steps, from the Lamorna quarries; upon these rests a block of Penryn stone, weighing about 12 tons, on which the four inscriptions in lead are cut. The superstructure comprises a boldly splayed octagonal plinth, with gablets on four sides, having sunk panels filled in with a cross on the front face, and coronets and ciphers of Lords Carnarvon, Sunderland, and Falkland carved on the other panels. The octagonal shaft which surmounts this is a monolith, 17 ft. in height, the total height of the memorial being about 33 ft. About 40 tons of granite have been used in the work. The east side bears a passage from Thucydides, and the west side a quotation from Livy. On the north and south sides respectively are the following inscriptions:—

"IN MEMORY OF THOSE
WHO, ON THE 20TH SEPTEMBER, 1643,
FELL FIGHTING IN THE ARMY OF KING CHARLES I.
ON THE FIELD OF NEWBURY: AND ESPECIALLY OF
LUCIUS CARY, VISCOUNT FALKLAND,
WHO DIED HERE IN THE 32ND YEAR OF HIS AGE.
THIS MONUMENT IS SET UP BY THOSE TO WHOM
THE MAJESTY OF THE CROWN AND
THE LIBERTIES OF THEIR COUNTRY ARE DEAR."

"THE BLOOD OF MAN IS WELL SHED
FOR OUR FAMILY,
FOR OUR FRIENDS, FOR OUR GOD,
FOR OUR COUNTRY, FOR OUR KING;
THE REST IS VANITY,
THE REST IS CRIME."—*Burke.*

Cellar Dwellings in Clonmel. — The Public Health (Ireland) Act provides that it shall not be lawful to let, or suffer to be occupied, any cellar not 7 ft. high in every part, and at least 3 ft. of its height over the surface of the adjoining street, unless there is outside the cellar, and extending along the entire frontage thereof and upwards from 6 in. below the level of the floor thereof up to the surface of the street, an open area at least 2 ft. 6 in. wide; unless the cellar is effectually drained, and has an earth-closet, ash-pit, &c., and unless it has a fireplace, external windows, &c. The *Tipperary Free Press* says that there are a considerable number of cellars occupied in Clonmel, but not one of them will come up to the requirements of the Act.

RAILWAY COMPANIES AND THE PUBLIC.

SIR,—Great trouble is experienced in dealing with railway companies, and the feeling is growing that these monopolies are inimical to the interests of the trading public. Against the fiats of directors there is no appeal, and at obvious injustice small traders can only grumble. In no case, perhaps, is this more glaringly displayed than in the farce of attempting to recover for damage to goods during transit. Tradesmen know, to their cost, how difficult it is to meet with satisfactory recompense for what must annually form a very serious item, viz., the breakage or damage of their goods in transit. When the damaged articles have been viewed, and a claim has been made, an intimation is received that the matter will be inquired into; and, often enough, this is the last of it. Compensation is certainly made sometimes; but even then it is a poor compensation. A great deal of time is expended in inquiries and wearisome delays, and if the goods are urgently required, or are of a special description, no allowance is made for the inconvenience and loss of time. Many tradesmen suffer this annual loss patiently, although they wince under it. They know full well that it is ridiculous for private individuals to cope with high-handed monopolies; for to fight a railway company one need possess a gold-mine.

It is not merely that there is much procrastination in settling claims. Some are never settled at all. And, worse still, the railway companies' representatives sometimes endeavour to cheat the public. An instance of this occurred recently. A gentleman, changing his residence, directed some articles of furniture, &c., packed by experienced men, to be forwarded to him, and caused them to be carefully labelled, "At the Company's risk," and paid the company's special rate for such articles. On delivery, some of them were broken, and the head of the household being away, his wife called upon the station-master to inform him of the damage, whereupon he roundly and positively asserted that the company "never, under any circumstances, carried anything at their own risk." After a great deal of equivocation, he promised to send a man to view the articles, and also to institute inquiries. He has not done so, however, and no more has been heard of it. The owner of the goods dubs the affair "a swindle." But, dismissing him and his righteous indignation, I may be permitted to ask these questions: Is it just or expedient for the general public to be at the tender mercies of the railway companies? Is it just that when they engage to carry goods at their own risk, and impose special rates to cover loss, they should treat claims for damage with indifference, or attempt to defraud those who have paid special rates, relying upon the company's *bona fides?*

T. B.

ABBOT TRUMPINGTON'S TOWER-ROOF.

SIR,—Perhaps an attempt to interpret some statements of Matthew Paris having reference to the aspect of the Norman Tower at St. Alban's during the period of the high-pitched roofs may not be deemed inopportune by some of your readers:—

Translation from the "Gesta Abbatum," book i., p. 280, in the Chronica Monasterii S. Albani,—Rolls Series.

"In his time (William de Trumpington's) both the transepts (*alæ*) of the church were fortified with roofs of oak timber, admirably tied and united with short beams; for the previous roofs, being decayed and worm-eaten, freely admitted the rain. The tower-roof also, which rose aloft like a huge machine (*quod præmaximæ machinæ instar protendit*), was reconstructed of the best timber, well jointed together, being raised to a much greater elevation than the old roof (*multo excelsius veteri*), which threatened to fall. And all these constructions were covered with lead, not without considerable outlay." These works were executed by Richard de Tidenhangaer, lay-brother and chamberlain. . . . . "Nevertheless, the Abbot himself, after the death of the said Richard, of blessed memory, caused the same steeple (*turrim*, which here appears to mean *the tower-roof* or *spire*) to be stripped, and covered afresh more congruously and correctly, a considerable addition being made to the quantity of lead; decorative additions being made to the sides (*collateralibus additis ornamentis*),

viz., eight linear projections (*linearibus elevationibus*), (perhaps projecting ribs are intended), extending from the finial (?) (*tholus*) to the wall-coping (?) (*murale*) (corbel table, ?) so that the spire appeared more distinctly octagonal (*octogona*). This was undertaken at his own cost, by the persuasion and instigation of Dom Matthew, surnamed, *of Cambridge*, his staff-bearer and seal-bearer, as was proved by the fact, that the latter was put in charge of the work, as a careful overseer, director, and warden. Moreover, he altered the covering (*co-operturam*) into the fashion which exhibits transversely conical projections (*quæ ex transverso conos protendit*) (or, which exhibits cones rising at opposite points). And the forementioned linear projections, commonly termed *aristæ*, admirably strengthened the spire, and adorned it at the same time, and also more effectually resisted the rain; whereas previously when the eight sides (*costæ*) were blended (or, died into one another), the spire presented a smooth, slender, and meagre appearance, uncouth, and out of keeping with the corbel-table (?) (or, parapet) (*minus murali concordantem*)."

The rendering, where the Latin is annexed, is offered with diffidence, on account of the obscurity of some of the Mediæval terms. But, perhaps, from a careful consideration of the whole passage, we may gather as much as this:—Abbot Trumpington thought the Norman roof (which was probably pyramidal) too low and heavy-looking; and, as he was compelled to rebuild it, he substituted an octagonal lead-covered spire, of much greater altitude, and afterwards added ribs or mouldings to its edges. The cones were perhaps the cappings of the corner turrets. In outline and proportions his wooden spire may possibly have resembled the Early English stone one of the cathedral of Christ Church at Oxford. At any rate, it seems a reasonable supposition that it added considerably to the effective height of the tower in its relation to the elevated roofs of the surrounding pile.

It appears that this spire was injured by lightning in the time of Abbot John of Hertford (1235—1260)), the Papal seal affixed to its summit notwithstanding (Gest. Abb., i. 313). After this it disappears from the annals. But in the Mediæval representations of the church still existing, viz., on the reconstructed shrine, and in the illuminations of the Cotton MS., Nero D. VII. (*circa* 1400) a spire is shown. The feature was therefore probably maintained.

The visible proofs of Trumpington's taste forbid the notion that his tower-roof had any resemblance to the attenuated peak which was removed some forty years ago. H. F.

CASE UNDER METROPOLITAN BUILDING ACT.

CHIMNEY BACKS.

AMONG several summonses taken out by the Metropolitan Board of Works under the Dangerous Structures Act, heard before Mr. Flowers (Bow-street), were two against the owners and occupiers of Nos. 39 and 40, Drury-lane.

Mr. Napier, who appeared in support of the summonses, said the owner of the house No. 39 had caused one of the recently-invented cooking ranges to be placed in an ordinary fireplace without having the proper firebricks placed in the flue. The result was that the party-wall became so heated on the side belonging to No. 40, that a thermometer burst at 200 degrees when placed against the wall, and a match held in the same place ignited without the least friction. The owner of No. 40 admitted the danger, and had consented to an order being made for his share of the necessary work to be completed in twenty-eight days. The owner of No. 39, the person whose action had created the danger, however, resisted the application for the order.

Mr. Robert Walker, district surveyor of St. Martin's-in-the-Fields, gave evidence as to the danger arising from the overheating of the flue. He said a similar case occurred some time back in St. Martin's-lane. The last Building Act was passed before these kitcheners were invented, and consequently no provision was made for these cases: but one of the clauses provides for certain works to be done in the case of a steam-boiler being used, and this case was somewhat similar to that. Witness thought that the magistrate could deal with the case as with a dangerous structure.

Mr. Flowers said it was like the bicycle case: invention had outstripped legislation. However, in this case he should certainly deal with the party-wall as with a dangerous structure.

The owner of No. 39 said he might tell his Worship that there would be no danger at all if the people in No. 40 had not put up a lot of wooden fixings next to the party-wall.

Mr. Flowers observed that this statement would decide him to make the order against the owner of No. 39. The owner of a house certainly had the right to put up what fixings he liked. He then made the order for the necessary work to be done in fourteen days.

THE LATE MR. E. W. LOWER.

SIR,—It may interest many of your readers to know that Mr. Edward Ward Lower, formerly Surveyor in the Office of Metropolitan Buildings, died at his residence at Guildford, on the 7th inst., where he had for many years practised largely as an architect until recently, when enfeebled by paralysis, he gave up the business to his son, Mr. W. G. Lower.

In 1855, when the present Building Act was passed, he was the author of a very useful edition, containing "Notes and Suggestions," which his large experience under the official referees enabled him to give with every reliance to the profession.

HENRY HART,
District Surveyor, West Kensington.

PUBLIC-HOUSE VALUATION.

MILLER *v.* DOBBIN.

THIS was an action brought in the Exchequer Division of the High Court of Justice to recover damages for alleged misrepresentation as to the value of the public-house known as the Three Compasses, Sidney-street, Mile-end-road, upon the sale of the house in May, 1877, by the defendant to the plaintiff. From the statement of the plaintiff's claim, it appeared that the plaintiff, Mr. Henry Miller, entered into an agreement to purchase the lease and goodwill of the premises from the defendant, Mr. Harry Dobbin, for 6,400*l.* (exclusive of the stock), upon the representation that the takings of the house amounted to 340*l.*, and the payments to 235*l.* per lunar month. That on May 17, 1877, he took possession of the house, and found that neither the takings nor the payments at all came up to the sums which had been so represented to him. The defendant, by his statement of defence, denied that he ever made such representations, or that the plaintiff was induced thereby to purchase the house. He further stated that if any such representations were made the same were *bonâ fide* and true, and he also denied that the plaintiff had sustained any damage whatever. With the consent of both parties, the matters in dispute were referred to the arbitrament of Mr. Daniel Cronin, senior. The hearing of the case occupied six days. The arbitrator has published his award in favour of the plaintiff, assessing the damages at 1,198*l.*, which he directed the defendant to pay to the plaintiff, together with the plaintiff's costs of the action.

MASTERS AND MEN.

Depression in the Lead Trade.—It is stated that owing to the great depression in the lead trade, the London Lead Company, Teesdale, have intimated their intention of discharging a large number of workmen, including pickmen, mechanics, labourers, and others. The precise number to be discharged is not yet known. This company, one of the oldest in the United Kingdom, has long afforded employment for the great bulk of the inhabitants of Upper Teesdale.

The Industrial Outlook in America.—Trade news from America is discouraging to every attempt at emigration just now. The building trade in New York, in order to deter emigrants from Ireland from venturing forth to seek their fortune in the States, gives notice that no "excursionists" from Europe are henceforth to be employed as masons or bricklayers in the new buildings now in course of erection in the city. It is stated that a regular organisation of building operatives has been established to prevent the arrival of the numbers of unwelcome visitors who usually emigrate at this season of the year and serve only to increase the distress and lower the wages of the native workmen.

Visitors to the Paris Exhibition.—The visitors to the Paris Exhibition, up to the end of July, numbered 6,570,093, or, reckoning only those who paid for admission, 5,056,139, as compared with 3,846,479, up to the same date in 1867, though the opening was that year a month earlier.

CLOCKS AND BELLS.

Stowmarket.—The bells of Stowmarket Church tower are now undergoing repair by Messrs. G. Day & Son, Eye.

Pollokshields.—A turret-clock is being provided for the parish church, Pollokshields. It has four illuminated dials, each 7 ft. 2 in. in diameter—the dials, it is said, being larger than those of any other turret-clock in Scotland. The clock will strike the hours on a bell weighing 24 cwt. All the wheels are made of the finest gun-metal. The main wheels are 18 in. in diameter, and 1½ in. in thickness. The escapement is "Graham's dead-beat," with wooden rod pendulum, 14 ft. long, the ball of which weighs 1½ cwt. The striking weight of the clock weighs 5 cwt., the gong 1¼ cwt. The clock is fitted with a self-acting lighting machine for illuminating the dials. Messrs. H. & R. Millar, Edinburgh, are the makers.

SURVEYORSHIP ITEMS.

Poole.—A meeting of the Poole Town Council was held on the 31st ult., to receive "tenders" for the appointment of borough surveyor and inspector of nuisances to the Urban and Port Sanitary Authorities, which offices had been rendered vacant by the death of Mr. Edmund Pearce, sen. The mayor said there appeared to be an omission in the advertisement, which did not state the term for which the appointment would be made, and he thought it would be advisable, before they opened the tenders, to determine whether the appointment should be for one year or three years. At the request of Councillor Curtis the town clerk read the advertisement inviting tenders for the offices. Applicants were desired to specify the amount of salary expected, and the candidate might receive pupils, but must not engage in private practice of any description, and must devote his whole time to the duties of the offices, which he must be competent to perform. Councillor Stone moved that the appointment be for twelve months certain, afterwards determinable by three months' notice being given on either side. This was agreed to. In answer to a question the town clerk said there were sixty-three tenders. The applications were referred to a committee.

Bognor.—At a meeting of the Bognor Local Board on the 5th inst., letters were read from the six selected candidates for the post of surveyor, viz.: Mr. Billington, of Leicester; Mr. Inkpan, Chichester; Mr. J. H. Moore, Bournemouth; Mr. A. Smith, Bognor; Mr. Stringfellow, Brighton; and Mr. F. Wilson. The clerk reported that, in reply to letters sent by him, the first three applicants replied that they had no special knowledge of sea defences, but the remainder said they had had much experience in that department on different parts of the coast. The Rev. A. Conder then moved, and Mr. Jenkins seconded, that Messrs. Billington, Inkpan, and Moore be eliminated from the selected applicants. Mr. Jenkins was of opinion that the Board ought to have an interview with Mr. Stringfellow and Mr. F. Wilson before venturing to elect either. Mr. Coote observed that Mr. Smith was appointed surveyor two or three years ago, but in consequence of some ill-feeling he was obliged to resign. Mr. Long thought a special meeting ought to be held to decide the matter. It was then resolved to adjourn the meeting.

Irish County Surveyors.—The *Freeman's Journal* says that there has been printed a return, moved for in the late session by Mr. Gray, describing the county surveyors and their assistants in each county in Ireland for the year ending with the summer assizes, 1877, as follows:—Name of each county surveyor, with amount of salary and allowances; name of each separate county in which he has served, and number of years served in each; name of his immediate predecessor, and whether same resigned, was dismissed, was removed to another county, or was superannuated, with the amount of retiring allowance granted to him; average annual cost of works for last five years in county other than roads, drains, and other routine work, and requiring special engineering skill in their design; number of assistants under each county surveyor, with their salaries.

Dr. Schliemann is said to have obtained permission from the Greek Government to commence certain excavations at Ithaca.

DRAINAGE ITEMS.

Burnley.—On the 23rd ult. a lengthened inspection was made of the Burnley Sewage Works by Mr. J. Bentley, C.E., of Brighouse; Mr. J. Farrer, C.E., of Bury; Mr. J. Green, C.E., of Manchester; Mr. H. Jobling, surveyor to Canon Townley Parker, who obtained the injunction against the Burnley Corporation; Mr. Storey, surveyor to Mr. Townley Parker; Mr. Creeke, town clerk of Burnley; Mr. Edwards, the borough surveyor of Burnley; and others. A general opinion was expressed that the works and system of General Scott were well worth a visit and study from all the sanitary authorities of Lancashire.

Hartford.—At a meeting of the Northwich Sanitary Authority, on the 30th ult., the report of the committee appointed to inquire into the question of the sewerage of Hartford was read. The committee recommended that the system of sewerage for the township of Hartford as originally designed by Mr. Vawser, and marked No. 1, be carried out. The committee also recommended the Authority to apply the pail-closet system in the whole of the township of Hartford at once; and further suggested that the filtered sewage might be well used for irrigating purposes at the outfall near Hartford Hall. The report of the committee was adopted.

Handsworth.—At a meeting of the Handsworth Local Board, on the 4th inst., a resolution was carried empowering Mr. Humber, C.E., to proceed with the contract plans, sections, detailed drawings, specifications, and quantities for the No. 1 sewer from Witton-lane to Hamstead-road, so as to be ready to advertise for tenders as soon as the sanction of the Local Government Board to the loan had been received. With respect to the Handsworth and Aston sewerage scheme, the clerk received authority to write to the Local Government Board for their sanction to a loan for 6,750*l.* for the joint sewers.

Torquay.—Ten years ago the local authorities of Torquay resolved upon providing a proper system of drainage, and finally adopted a suggestion by Sir Joseph Bazalgette to construct an intercepting sewer, from the railway station to a point nearly four miles distant, rejoicing then, if not now, in the designation of Hope's Nose. The work was commenced in 1875, but the contractors found that hard shale and limestone existed to a far greater extent than they had anticipated; and, further, that although the shale was particularly difficult to blast, yet on exposure to the air it decomposed, and the tunnel in which the sewer was carried had to be lined with concrete and brickwork to an extent that had never been thought of. Further than this, large bodies of water poured in, and the combined misfortunes led to the failure of the contractors. Fresh tenders were invited, but the lowest amounted to 75,000*l.*; and in further necessary additions the total cost would have been brought up to over 100,000*l.* Seeing this, the Local Board determined to execute the work themselves. The rock has been bored by drills similar to those used in driving the Mont Cenis tunnel, and eleven tons of dynamite have been used in blasting. The entire work has been completed by the Board at a cost of 65,000*l.* The sewer is in its first lengths 5 ft. 6 in. in height, and the last tunnel is a mile in length. The sewer is said to have a good fall, the flow is at the rate of two miles and a half an hour, and the discharge is 8,000 cubic feet per minute.

Windsor.—The town council of Windsor, acting as the Sanitary Authority, have entered into a contract with Mr. Hillé for the treatment of the sewage by the process known as "Hillé's system," and in a few days the new works will be in operation. It is now more than ten years since the Windsor town council was served with the first notice under the Thames Conservancy Act, to discontinue the drainage of the town into the River Thames. Having only about ten years before constructed a system of drainage at a heavy cost, this new responsibility fell heavily upon the town. The corporation at once set to work, with a view to devise some new system; but the town was so hemmed in by royal property, that every proposed site for drainage works was strongly opposed. About three years ago a piece of land was obtained on the Ham, at Old Windsor, about two miles distant, and adjoining the Castle Sewage Farm, where it is intended to treat the sewage by a combined system of precipitation and filtration. Under the direction of Mr. Hawksley, C.E., a new outfall sewer from the point where the existing sewers concentrate to Old Windsor has been constructed, crossing under the navigation cut to the Ham. This has been a work of great difficulty. A portion of the sewer has been constructed in a tunnel; but at Old Windsor it had to be laid in a cutting in a wet sandy soil, at a depth of over 40 ft. The tanks on the Ham are very extensive, and the buildings are most substantially built. The cost of the works, it is estimated, will be about 40,000*l.* Mr. Hillé, who is to be paid a royalty of 50*l.* a year, will manage the works for a short time at his own charge, and will then hand them over in full operation to the town council.

HOSPITALS.

Bury.—On the 24th ult. the Guardians of the Bury Union opened a new infectious hospital close to the workhouse. The plans, which are stated by a Manchester paper to have been described by the authorities at the Local Government Board as "excellent in themselves, and greatly in advance of anything hitherto attempted," are the result of visits to different infirmaries and hospitals, and consultations between the architect of the guardians, Mr. L. Booth, of Manchester, and Dr. Mouat, Mr. P. Gordon Smith, and the late Capt. Bowly, who represented the medical and architectural authorities of the Local Government Board. The site is a plot of land situate between the cemetery and the workhouse buildings, and is open on three of its sides. The patients are to be accommodated in four several and distinct blocks, each one of which is fitted up complete in itself as a separate hospital. The only connexion between the blocks is a wide covered way, open at the sides, and covered by a wide projecting roof, affording protection in all sorts of weather. By this arrangement any one block can be used for a distinct kind of fever, or for either sex, without interfering with the proper and safe use of the other departments in any way.

Northwich.—The Northwich Rural Sanitary Authority proposes to erect a new hospital for infectious diseases, and Mr. L. Booth, architect, Manchester, has prepared plans for a permanent building. These plans have, it seems, been criticised by Dr. Fox, the medical officer of health, who is apparently in favour of a series of temporary sheds or shanties. Mr. Booth, in an exhaustive reply, maintains that to erect a permanent building will be much cheaper in the end, and that due isolation of cases can be provided for.

Non-Pauper Hospitals for Infectious Diseases.—Dr. Talbot, the medical officer of health for the Bow and Bromley division of the Poplar district, points out, in his annual report just issued, that during the past year he has frequently been unable, through the want of accommodation at Highgate, to order the removal of private cases. He therefore contends that the action of the Poplar District Board of Works in proceeding to erect a non-pauper hospital for the district is only in accordance with what experience has proved to be necessary, and he expresses the conviction that the decision of the Board in this respect will do more to earn the thanks of the ratepayers than any other local work hitherto done. He further urges that the 37th section of the Sanitary Act must be made compulsory, or the Poplar district will be supplied with cases from all parts of the metropolis, and adds that his experience justifies the belief that when the requisite accommodation is provided the public will become anxious to be removed to hospitals.

Gateshead.—On the 3rd inst., the Mayor of Gateshead (Mr. J. W. Robinson) opened the new schools which the Board have erected at Low Fell, for the accommodation of the children resident in the district. The new buildings comprise a commodious and well-lighted school-room, a large class-room, a mistress's private room, children's cap-room and lavatory, and two rooms for the resident caretaker. In the play-ground are the children's conveniences and a large covered play-shed. Externally, the schools are executed in red bricks, with stone dressings, slated roof, and red ridge tiles. The works have been carried out, at a cost of 1,500*l.*, by Mr. Thomas Robson, builder, of Low Fell; and Mr. Edington has acted as clerk of the works. Mr. Thomas Oliver, of Newcastle, is the architect.

"THE VENTILATION QUESTION."

"WHO shall decide when doctors disagree?" is the question suggested by perusal of the letters by Mr. Buchan and Mr. Weaver in your last week's issue. It is at least a remarkable coincidence (if nothing else) that the figures published by the different writers should always show in favour of the ventilator patented by the particular writer. The inevitable conclusion of impartial persons who are unable to verify the readings by experiment is that whatever the merits of the various ventilators may really be, the figures given are worthless as an evidence of these merits. May we, then, depend upon testimonials signed by men whose names, one would think, ought to be a sufficient guarantee? To dispel such an illusion it is only necessary to compare certain advertisements constantly appearing with published results of tests lately made. The conclusion practical men are apt to arrive at is that one ventilator is as good as another, and that none are of much use.

May we take leave to suggest that the safest, and indeed under the circumstances the only prudent course to take in selecting a ventilator is to test a few specimens (not models) by simple experiments before purchasing or fixing. If a cowl is capable of producing an up-current at the top of a building it is as capable of producing an equally strong up-current in a shop or a room. The only difference so far as efficiency of ventilation is concerned is the absence of wind, which is easily supplied by artificial means. If vigorous fanning over the mouth of a fixed ventilator or rapid revolution in the case of a revolving cowl is not *found on experiment* to produce a positive current upwards, so as to carry up light pieces of paper or oil silk, it cannot be wise to expect that it will increase the up-draught of a pipe or chimney, however useful it may be as a cap to keep out rain or prevent down-draught. On the other hand, if the up-draught is clearly demonstrated by experiment in a room with the same or precisely similar cowl, an increase of an up-draught may be reckoned upon for pipe or chimney.

EWART & SON.

CHURCH-BUILDING NEWS.

Croft.—The ancient church of St. Peter, Croft, has been reopened, after partial restoration, under the direction of Messrs. Ross & Lamb, architects, Darlington. The works embraced in the contracts have comprised the new roofing of the nave, tower, and south aisle, repairing and pointing the outside stonework; opening out old windows which had been walled up; stripping the plaster and whitewash off the internal stonework; re-seating the chancel and south aisle with pitch-pine stalls; repairing and re-setting old tracery and glass in windows; re-hanging the bells in the tower; taking down and rebuilding the south entrance-porch, which was in a ruinous condition; and excavating a sloping trench round the church down to the original floor-level, for the purpose of freeing the church from damp. The expense of restoring the nave was undertaken by Miss Harriett Chaytor, and of the south aisle by Sir William Chaytor, bart.; Lady Chaytor presenting a stained-glass window, by Hardman & Co. The repairs in the north aisle were at the expense of Mr. Wilson-Todd. The clerk of the works was Mr. Salmon; and the contractors were Messrs. Adamson, Gainford; Messrs. Russell, Mr. Wandless, and Mr. Swinbank, Darlington.

Milton (Devonshire).—The new church dedicated to the Holy Spirit has just been consecrated. It is in the Early English style, and consists of nave, chancel, vestry, and south porch. It is built of local walling stone, with Bath and Ham Hill stone dressings. The roofs are open, and of pitch-pine. The nave is furnished with chairs. The stalls are of oak, and so is the chancel screen. The font is of Bath stone, and is copied from an ancient one in the neighbourhood. The pulpit is of Bath stone. The east window has three lights, and is filled with stained glass by Messrs. Fouracre & Watson, of Stonehouse, Plymouth. The subjects represent the Baptism of our Lord, and the Descent of the Holy Ghost, the Gift of the Holy Ghost at Pentecost, and SS. Germanus and Lupus preaching upon the Banks of the Tamar. Over the porch is a tympanum, emblematic of the descent of the Holy Spirit, carved by Mr. Harry Hems, of Exeter. Over the vestry door is a picture in needlework by Miss Meadows—subject, the Annunciation. The dimensions of the building are:—Nave, 37 ft. 6 in. by 20 ft.; chancel, 20 ft. by 15 ft.; vestry, 12 ft. by 11 ft. The work has been carried out by Mr. Blowey, of Buckland Monachorum, builder, at a cost of about 1,600*l.* The whole has been executed from the designs and under the superintendence of Mr. Edward Ashworth, architect, Exeter.

Paddington.—The new church of St. Jude, Queen's Park, Harrow-road, was consecrated on the 3rd ult. It forms the chief feature of a group of buildings, to be hereafter completed by the addition of a parsonage-house, and is in the Early English style, stock bricks with red bands and arches being used throughout, and the whole covered with a tile roof 50 ft. high at the apex. All the sittings are placed in the nave under a roof of 40-ft. span, the nave being

separated from the aisle passages by arcades, thus affording to every member of the congregation a view of the pulpit and reading-desk. The building is lighted principally by a clear-story and aisle windows, with a large four-light window at the west end. The church contains 800 sittings, and has been erected at a total cost of 6,000*l.*, inclusive of tower and spire, but exclusive of boundary-wall and font, by Mr. Wheeler, of Highgate, under the personal superintendence of Mr. John T. Lee, architect. The pulpit is executed in Caen stone, with marble columns selected from various quarries, and has been given by the widow of the late Mr. Benjamin Shaw.

Slapton.—During the past year the nave and tower of Slapton Church have been restored, at a cost of 650*l.*, under the direction of Mr. William White, F.S.A., architect. At the present time, Mr. William Evans, of Abthorpe, is restoring, from the plans of the same gentleman, the chancel, at an estimated cost of 230*l.* When that is completed it is hoped to proceed with the south aisle and porch; and, in fact, to effect a complete restoration, at a total expense of 1,200*l.*, exclusive of the 650*l.* mentioned above.

Maesbrook.—On the 20th of August a new church, dedicated to St. John the Evangelist, was consecrated by the Bishop of St. Asaph at Maesbrook, in the parish of Kinnerley, Shropshire. The church has been built by the Misses Croxon, of The Lawn, Oswestry, in memory of their late brother, Mr. R. J. Croxon, and will serve as a chapel-of-ease for Kinnerley. Mr. Haycock, of Shrewsbury, was the architect, and Mr. Yates, of Shifnal, the contractor. The total cost of the church, which will accommodate 150 persons, was a little over 1,900*l.*

ROMAN CATHOLIC CHURCH-BUILDING NEWS.

Teignmouth.—A new Roman Catholic church, on the Dawlish-road, Teignmouth, Devon, has been opened. The new edifice is situate only a short distance from the smaller building in which the Roman Catholics have worshipped for many years, and from which they have been compelled to remove in consequence of this church forming a part of the property purchased some time since by the Great Western Railway Company to enable them to double the line between Dawlish and Teignmouth. The old church would only seat about 100 worshippers, whilst the new church, which is dedicated to Our Blessed Lady and St. Patrick, provides quite double the accommodation. The church stands nearly north and south, and consists of sanctuary, nave, two aisles (of which only one is now built), lady chapel at the north end of the east aisle, and the baptistry at the other end. In the contemplated extension of the west aisle is comprised another side chapel, a calvary, and a permanent confessional. It is further intended, when the means admit it, to build a presbytery. The style is the Geometrical Decorated, and the cost has been about 3,500*l.* The contractor is Mr. Slocombe, of Teignmouth, the architects being Messrs. Joseph A. Hansom & Son.

Wigan. — A new Roman Catholic church, dedicated to St. Joseph, has been opened at Wigan. The church is 87 ft. in length, and 60 ft. wide, and accommodation is provided for about 1,000 persons. A residence for three priests has been erected in contiguity to the church. The cost of the church has been nearly 7,000*l.*

Liverpool.—A new Roman Catholic Church, situated in High Park-street, Liverpool, has been opened for worship. The foundation-stone of the new edifice was laid on July 16th, 1876, and in the following year building operations were commenced. The building was designed by Mr. O'Byrne, and has been erected by Messrs. Roberts & Robinson, of Bevington-hill, at a cost of nearly 7,500*l.* It has no galleries, but has a lofty nave, with open-timbered roof, supported on columns of Shap granite, the capitals of which have been carved by Mr. Hanley, of Chester. The building is of pressed bricks, with Runcorn stone dressings, and is seated to accommodate 800 persons.

Rugby.—On the 12th ult. the Rev. Dr. Ullathorne, the R.C. Bishop, laid the foundation stone of a new Roman Catholic Chapel to be built adjoining Newnham Paddox, the seat of Lord Denbigh. The chapel, which is to be a Gothic structure, with handsomely decorated interior, runs east and west, and its west end will form a portion of the west side of the mansion. It is intended for the use, not only of Lord Denbigh's family, but of the Roman Catholics resident in the neighbourhood. Mr. J. Bromwich, of Rugby, is the contractor, and Mr. W. J. Allen the clerk of the works.

Dundee.—A Scotch paper says that in celebration of the re-establishment of the Roman Catholic diocese of Dunkeld, which has been in abeyance for a period of 292 years, it is proposed to erect a cathedral church in Dundee. The Marquis of Bute has initiated the subscription by promising 5,000*l.* It is hoped that 60,000*l.* will be raised.

SCHOOL BOARD SCHOOLS.

Bradford (near Manchester).—The memorial stone of the first schools built by the Bradford School Board, which will be situated in Grange-street, and are expected to be completed in the early part of next year, has been laid. The schools will provide accommodation for about 1,000 children, in four departments, viz., 300 infants, 250 girls, 250 junior boys, and 200 senior boys. In planning the schools, 10 superficial feet have been allowed for each boy and girl, and 9 superficial feet for each infant. The schools are all on the ground floor, and are so arranged that a considerable portion of the teaching will be conducted in class-rooms. The whole will be warmed with hot-water pipes, and in each of the large rooms there will be an open fireplace, with a Manchester school grate. A board-room, waiting-lobby, caretaker's residence, and covered playgrounds are provided, and in connexion with each department there will be a lavatory and cloak-room. The whole of the inside walls to a height of 4 ft. are intended to be faced with coloured enamelled bricks, so as to be easily washed clean; and all the inside joiners' work will be of pitch pine, varnished. The work is being carried out by Mr. Joseph Grason, for the sum of 5,838*l.*, under the superintendence of the architect, Mr. Thomas Chadwick.

Brixton.—In a remote corner of Brixton, near to Clapham Common, new schools belonging to the London School Board have been publicly opened. The building, designed in the Queen Anne style, is situated at the top of Lyham-road, and in it accommodation has been provided for 791 children, at a cost of 14*l.* 3s. 6d. per head. The site covers 21,280 square feet, thus allowing of an ample playground. Mr. E. R. Robson is the architect.

Walworth.—New schools in Beresford-street, Walworth, have been opened by the London School Board. The cost of the building, including the site, was 13,588*l.*, and as it is to accommodate 697 children, the average cost of the accommodation for each child is 19*l.* 9s. 11d. There is a good playground attached, and room has been left for an enlargement of the school. Mr. E. R. Robson is the architect.

VARIORUM.

AN interesting discovery is communicated in the last number of *L'Art* by M. Courajod, of the Louvre, who has found amongst the MSS. in the National Library the design by Germain Pilon for the Mausoleum of Cardinal René Birague. The principal point established by this document is that the bronze figure of the Cardinal, one of the most beautiful monuments in the Musée de la Renaissance at the Louvre, is unquestionably the work of Germain Pilon. The contents of *L'Art* continue to be remarkable. English art, too, is well looked after in it under the special and able direction of Mr. J. Comyns Carr. ——We take the following as to Decks from the new number of *Great Industries of Great Britain*:—"The usefulness of decks as structural strengtheners was scarcely recognised a century ago: and until iron ships of large size became common, the full advantages derivable from carefully-constructed decks were not realised. Now it is a generally accepted principle of construction that the decks, and especially the upper deck, should be classed amongst the principal parts of the structure, effective against strains tending to alter the form of a ship either longitudinally or transversely. Longitudinal bending in a ship, — 'hogging' or 'sagging,' as a shipwright would say, — can only result from an extension or compression of the upper and lower parts of the structure; and ordinarily it is the upper deck which has to sustain the most severe tensile or compressive strains. Comparing a ship to a hollow tubular girder, like the Menai Bridge, her upper deck corresponds roughly to the top of that girder; her bottom, from the bilge downwards, corresponds to the bottom of the girder; while her nearly vertical sides correspond to the side webs of the girder connecting the top and bottom. There are, however, a few important differences between the ship and the bridge. In the latter all the bending strains tend to stretch the bottom and compress the top; whereas in the ship there are great *variations of strain*, the top being sometimes compressed and at other times stretched. The bridge is fixed in position, the top and bottom not changing their relative positions; but the ship rolls from side to side while she is being strained, and it is impossible to define absolutely what parts shall be regarded as the top and what as bottom. Moreover, the circumstances sketched for the ship obviously create simultaneously transverse as well as longitudinal strain, a matter which still further complicates the problem. A deck, for example, may not merely have to act as part of a girder resisting longitudinal bending, but at the same time may have to tie the two sides of a ship together, and assist in preventing change of transverse form, in addition to acting as a platform carrying heavy weights of cargo or equipment."—"Old and New London" says:—"To place the matter in another point of view, we may state that the size of 'Greater London,' with its population of three millions and a quarter (according to the last census returns), may be inferred from the fact that if the metropolis was surrounded by a wall having a north gate, a south gate, an east gate, and a west gate, each of the gates being of sufficient width to allow a column of persons to pass out freely six abreast, and a peremptory necessity required the immediate evacuation of the city, the task could not be accomplished under four-and-twenty hours, by the expiration of which time the head of each of the four columns would have advanced a no less distance than seventy-five miles from its gate, all the people being in close file, six deep. Or, to take another illustration: if all the Londoners of to-day—men, women, and children—were to stand joined shoulder to shoulder, the line formed by them would stretch nearly from one end of England to the other. Again, if the entire people of the capital were to be drawn up in marching order, two and two, and each couple to be 2 ft. apart from the next, the aggregate length of the great army of Londoners would not be less than 662 miles, or long enough to reach from London to Inverness; while, supposing the file to move at the rate of three miles an hour, it would take more than nine days and nights for the aggregate troop of the metropolitan population to pass by."—At the present time, when the scientific mind is awakened to the importance of those less evident forms of motion in matter which we designate variously as vibrations, undulations, heat, light, sound, &c., it may prove of interest to learn the results of a series of experiments, carefully instituted by Mr. A. Tylor, F.G.S., as to the mode in which undulations are propagated in water, and the bearing of these results on the accepted theory of tidal waves, &c. Some of these experiments have been detailed in the September number of the *Mittheilungen der K. K. Geographische Gesellschaft*, of Vienna, for 1877; and others have been laid before the London Institution by Mr. Tylor himself; but the facts are not so generally known as their importance merits. By means of a specially constructed apparatus, consisting of a circuit of 24 ft. of 10-in. glass pipe, laid horizontally, and provided with a box, in which waves could be generated by a head of water of about 1 ft., Mr. Tylor found that a wave traversed the whole circuit under ordinary atmospheric pressure in 4·475 seconds, but that its velocity was so far diminished as to require 4·925 seconds to make its second circuit, which is equivalent to a loss of 9 per cent. of its velocity. A wave caused by the same head of water in the generating-box, but moving in a partial vacuum (18 in.) took 4·76 seconds to complete its first circuit, and showed no calculable loss of velocity in making its second circuit. Mr. Tylor concludes, from these results, "that the velocity of a wave is dependent on the quantity of air which it has to move, and that a wave can only propagate itself until it has displaced its own weight of air," leaving out of account the loss of power due to friction and other obstructions. Upon this basis formulæ have been constructed, which give the limit of possible propagation of any given wave.——We have received a copy of a

special number of the *Illustrated Australian News*, which contains a series of engravings representing the more important buildings, manufactures, and works at Melbourne, and some of the other towns of Victoria, Australia. It also contains an interesting account, in French and English, of the colony, its history, its climate, its institutions, and the advantages which it offers to Colonists. It must be regarded as a remarkable number, considering the locality.

FIRE ALARM.

SIR,—Observing in your paper of September the 7th a description of a self-acting "Fire Alarm," exhibited by Mr. E. B. Bright, at the Old Manchester Town-hall, on the 29th of August, I beg to say I patented this invention December 1st, 1864, and have ever since been in the habit of fitting up these "Fire Alarms," in connexion with my electric bells, which are very extensively used throughout the country and metropolis. My invention being made in the form of an ordinary press-button, it combines the utility of electric bell to that of "Fire Alarm" thermometer. I have also supplied large numbers to the cotton manufacturers of Yorkshire, who place them in their bales of goods in order to give notice of extra heat, and so prevent spontaneous combustion.

JULIUS SAX, Telegraph Engineer.

THE BROMPTON ORATORY.

SIR,—Our attention has been drawn to the letter of a correspondent in your last impression, stating that the design for the new Church of the Oratory chosen for execution is that to which the first prize was awarded, and also that the services of its author, Mr. Herbert A. Gribble, are secured in carrying out this building.

Whilst this information is correct as far as it goes, will you allow us to complete it by saying that the execution of the building has been entrusted to the joint care of your obedient servants,

HERBERT A. GRIBBLE,
J. T. WALFORD.

Miscellanea.

The New Sheriffs of London and Middlesex.—Messrs. George Burt and Thomas Bevan will enter upon their duties as sheriffs of London and Middlesex on the 28th instant. Mr. Burt (according to the *City Press*) was born at Swanage, Dorset, October 2, 1816. His father, Mr. Robert Burt, was a stone merchant there. At the age of 19, the late Mr. Mowlem (also a native of Swanage, and Mr. George Burt's uncle) brought him to London as an assistant in his business. In 1844, Mr. Mowlem took Mr. Burt and Mr. Freeman (who had previously married Mr. Burt's elder sister) into partnership, the firm from that time being known by its present title of "John Mowlem & Co." The senior partner died in 1868, and the business was carried on by Mr. Freeman and Mr. Burt until 1875, when Mr. John Mowlem Burt, the elder son of the newly-elected sheriff, was taken into partnership, and these three gentlemen now constitute the firm so well known in London as road and general contractors, and in Aberdeen and Guernsey as quarry-owners. They were the first to manufacture and lay down the pavement known as "narrow cubes." The first roadway so laid was that of old Blackfriars Bridge in the year 1840. Mr. Bevan is the son of the late Mr. Thomas Bevan, M.D., of Finsbury-circus, and was born in 1829. He entered business-life in 1853 with Mr. J. M. Knight and Mr. Alfred Sturge, constituting the firm of Knight, Bevan, & Sturge, who carried on for many years the business of cement manufacturers at Northfleet and elsewhere. Since the death of Mr. Sturge, and the retirement from business of Mr. Knight, the business has been carried on under the same title by Mr. Bevan, who has recently admitted into the firm his eldest son, Mr. Robert Bevan. It will be remembered that the introduction into the firm of Mr. Robert Bevan was made the occasion of opening a club and institute, erected by Mr. Bevan for the use of his large staff of workmen and others at Northfleet, at a cost of 10,000*l*.

The New Bow-street Police-court.—An Act of Parliament was passed in the session before last for the purchase of certain buildings and lands for the erection of a new Police-court for Bow-street, and also for the building of a new Police-station in conjunction. The property was duly secured, and the old buildings demolished. It is now found it will be necessary for the authorities to obtain a supplementary Act, as the Duke of Bedford, the adjoining ground-landlord, has obtained an injunction against the authorities on account of the boundaries encroaching on his land. In these circumstances the new building cannot be commenced until the middle of next year.

The Walker Art Gallery, Liverpool.—At the meeting of the Liverpool Town Council on the 4th inst., on the recommendation of the Library, Museum, and Arts Committee, the offer of Mr. Edward Aikin, on behalf of the family of the late Mr. James Aikin, of a full-sized copy in marble of the antique statue "The Crouching Venus," was accepted with thanks. Alderman Weightman called attention to the defective ventilation of the gallery. Alderman Samuelson (the deputy-chairman of the Library Committee) said the attention of the committee did not require to be directed to that, because the defective ventilation had been most sensibly appreciated by the committee since the gallery was opened. At first, however, as the gallery was scarcely out of the hands of Sir Andrew Walker, the committee had some delicacy in taking measures to improve the ventilation. Mr. Sherlock (the architect of the building) subsequently made some experiments which did not succeed, but at no distant date the committee would take the matter into their own hands and see what could be done.

Sewage Deposits in the Thames.—The operations connected with the recovery of the wreck of the ill-fated *Princess Alice* have again called attention to the highly detrimental effect of pouring the London sewage into the Thames. The extremely offensive slimy deposits found in both portions of the hull of the broken steamboat to the depth of 3 ft. or 4 ft. afford further corroboration, if such were needed, of the statements made by Captain Calver and others as to the injurious effect of sewage upon the river. True, the terrible calamity which has grieved the nation happened almost at the very outfall of the greater part of London's sewage. It is even alleged by some that the slimy state of the river bottom prevented many of the victims from rising to the surface, and that many of those who did not get stuck in the slime were poisoned by the sewage-laden water.

Jerusalem.—It is stated that, at the cost of Sir Moses Montefiore, bart., all the land in front of the Judah Touro houses has been prepared for cultivation by the removal of the rocks. Terraces are built all along, as in King Solomon's time, and divided into twenty-two partitions whereby all the inmates of the Touro houses will have an opportunity of cultivating the land, which will produce the necessary vegetables, &c., for their maintenance. In addition, the venerable baronet has caused a very large cistern to be constructed in the centre of the field, which will secure to them in future an abundant supply of water.

The Exhibition of 1851.—Mr. Chamberlain, M.P., has received a reply to the deputation of provincial municipal representatives which attended the meeting of the Royal Commission at Marlborough House last July twelve months, in reference to the freehold property at present occupied by the Horticultural Gardens and the Exhibition galleries, intimating that the Commissioners adhere to their proposal to apply that portion of their funds which they propose to dedicate specially for the benefit of the provinces in the establishment of scholarships.

The Ronalds Catalogue.—The Society of Telegraph Engineers are proposing to publish a Catalogue of Books and Papers on Electricity and Magnetism, compiled by the late Sir Francis Ronalds, F.R.S. This catalogue, which contains more than 12,000 entries, and will probably extend to over 600 pages, is believed to include every important work, and almost every paper which has been published upon the subject of electricity and magnetism up to the date of its author's death in 1873. It also forms a valuable catalogue of scientific works generally.

Lodging of Plans.—At a meeting of the Edinburgh Town Council on the 3rd inst., it was moved by Mr. Buchanan that in future all plans of buildings to be erected should be lodged with the Town Clerk for the approval of the Council. After some conversation, the Depute Town Clerk suggested the alteration of the motion to the effect that plans of buildings requiring the sanction of Council should not be approved of by committee without having been submitted to the Council; and in this form it was understood to be agreed to.

Government Offices, Downing-street.—The entire length of carriage-ways in the court-yard here are being laid with Claridge's asphalte, the same as was used at the Palace of Westminster, with the exception of two of the courts.

Sunday Opening of Free Libraries.—The Manchester City Council have instructed their Free Libraries Committee to make arrangements for the opening of the reference and branch library of that city on Sunday afternoons. The resolution was carried by 28 votes to 20. The public free libraries and reading-rooms in Manchester were opened on Sunday last in accordance with this decision. The new arrangement was not, it is said, taken advantage of to the extent that many persons had anticipated.

Boulogne Harbour.—Boulogne has been *en fête* on the occasion of laying the foundation-stone of a monument to commemorate the passing of the measure authorising the construction of a deep-sea harbour, accessible to large steamers at all states of the tide. The work will take fifteen years to complete. The plans and estimates have been made by M. Stoecklin, chief engineer of the Pas de Calais, and the cost is stated at 17,000,000 francs (680,000*l*.).

Water Supply, Inverkeithing.—At a meeting of the Inverkeithing Town Council, on the 28th of August, for the purpose of considering what further steps should be taken in regard to the proposed water supply for the burgh, it was resolved to employ Mr. Buchanan, C.E., Edinburgh, to prepare a report as to the best mode of laying pipes from Milesmark in connexion with the Glensherup scheme, and the probable cost of the same.

Newcastle Arts Exhibition.—The first exhibition of the Newcastle Arts Association, established early this year, was opened on the 6th inst. by a *conversazione*, to which invitations had been issued by Sir William Armstrong. The exhibition contains about 700 pictures, contributed by English, Scottish, and Continental artists.

Silicate Paint.—At the Paris Exhibition a medal has been awarded to the Silicate Paint Company, of London and Liverpool, whose paints received favourable notice at the Paris Hygienic Congress.

TENDERS

For additions to the Abbey Flour Mills, Reading, Berks, for Mr. George Palmer. Messrs. Morris & Stallwood, architects:—

		Unloading-shed.
Grover	£2,290 0 0	£48 0 0
Filewood	2,285 0 0	38 0 0
Searle	2,263 13 0	33 11 9
Dodd	2,258 0 0	45 10 0
Barnicoat	2,257 0 0	52 0 0
Woodroffe	2,250 0 0	50 0 0
Higgs	2,231 0 0	48 0 0
Sheppard	2,222 0 0	43 0 0
Poffley	2,164 0 0	45 0 0
Wheeler, Brothers	2,150 0 0	45 0 0
Lawrence	2,096 0 0	51 3 0
Wicks (accepted)	2,071 0 0	42 0 0

For building a factory chimney-shaft in connexion with the recently-erected factory for Messrs. Huntley, Boorne, & Stevens, Reading, Berks. Messrs. Morris & Stallwood, architects:—

Strong, Brothers	£315 0 0
Higgs	304 0 0
Searle	304 0 0
Wheeler, Brothers	300 0 0
Silver & Son	297 0 0
Grover	296 0 0

For additions to parish schools, Kidmore, Oxon. Messrs. Morris & Stallwood, architects:—

Slade & Cox (accepted)	£291 6 0

For the restoration of the tower to the Parish Church at Wokingham, Berks. Messrs. Morris & Stallwood, architects:—

Wheeler, Brothers (accepted)	£1,000 0 0

For the restoration and reseating of the Parish Church at Sulhamstead Abbots, Berks. Messrs. Morris & Stallwood, architects:—

Wheeler, Brothers (accepted)	£709 0 0

For new tower, south aisle, and porch, being the first portion of the enlargement and restoration of the Parish Church at Caversham, Oxon. Messrs. Morris & Stallwood, architects:—

Wheeler, Brothers, and Dodd (accepted)	£2,351 0 0

For alterations and additions at Deanwood, near Newbury, Berks. Messrs. Morris & Stallwood, architects:—

Hopson (accepted)	£1,022 5 0

For additions and alterations to a farm-house at Uppertown, on the Brightwell Park estates. Messrs. Morris & Stallwood, architects:—

Holly & Butler (accepted)	£957 0 0

For the erection of four labourers' cottages at Uppertown, on the Brightwell Park estate (including a well). Messrs. Morris & Stallwood, architects:—

Cox (accepted)	£812 0 0

For the erection of six cottages at High Cross-lane, Tottenham, for Mrs. Harvey. Messrs. H. S. & C. A. Legg, architects. No quantities:—

Steed, Brothers	£1,423 0 0
Knight	1,405 0 0
Judd	1,398 0 0

For the erection of a stable building at Turret House, Reading. Messrs. Morris & Stallwood, architects:—

White	£420	0	0
Poffley	420	0	0
Woodroffe	413	0	0
Whiting	403	0	0
Searle	399	0	0
Sheppard	390	0	0
Higgs	385	0	0

For stables for Mr. Albert P. Prowse, Yennadon Manor. Mr. J. O. Parmenter, architect:—

Blatchford & Son	£410	0	0

For a villa residence on the Knoll Estate, for the Rev. Sir G. W. Cox, bart., M.A. Mr. J. O. Parmenter, architect:—

Fitchen (accepted)	£550	0	0

For villa residences, Nos. 1 and 2, to be erected at Ascot for the Ascot, Sunninghill, and General Land Company, Limited. Mr. John Norton, architect:—

	Villa No. 1.			Villa No. 2.		
Pink	£2,490	0	0	£3,790	0	0
Boyce	2,196	0	0	3,694	0	0
Lawrence	2,000	0	0	3,700	0	0
Braid & Co.*	1,990	0	0	3,600	0	0
Colls	2,224	0	0	—		

* Accepted.

For alterations to Messrs. Samuel Smith & Co.'s banking premises, Ripley, Derby. Mr. George R. Isborn, architect:—

Clewer (bricklayer)	£159	5	6
Cooper (joiner)	182	10	1
Frost & Sons (plumber)	109	12	9
Tealby (painter)	85	9	6

For alterations and additions to the Prince Alfred Tavern, Eleanor-road, Dalston. Mr. Chas. H. Flack, architect:—

	Contract No. 1.	Contract No. 2.
Beale	£610	£1,200
Cole	640	1,150
Downs	515	1,065
Steed	485	—
Harris	450	925

For Pontfaen School, to accommodate 172 children, with residence and boundary-walls, for the Christchurch Extra Municipal School Board. Mr. H. A. Goodman, architect. Quantities supplied:—

		If Pitch-Pine Joinery.
Jones & Co.	£2,484	£2,504
Miles	2,240	2,300
Williams	2,200	2,180
Linton	2,195	2,200
Prosser	2,145	2,195
Richards	2,140	2,210
Moulton & Brownscombe	2,093	2,130
Jones & Son	2,037	2,047
Biggs	2,010	2,200
Small	2,000	2,050
Orphan & Swanton	1,769	1,789
Jones & Diamond	1,750	1,800
Richards	1,700	1,750
Wilkins (accepted)	1,661	1,686

For stabling, billiard-room, &c., Shirley Lodge, Clapham Park, for Mr. C. S. Whitburn. Mr. E. D. Mathews, architect. Quantities by Mr. R. C. Gleed:—

Loat & Co.	£1,040	0	0
Battley	979	0	0
Downs & Co.	960	0	0
Newstead	950	0	0

For new roads, sewers, and surface water-drains, on the Holly Park Estate, New Southgate, for Mr. Henry Davis. Mr. Henry B. Michell, surveyor:—

Killingback	£2,827	0	0
Dunmore	2,268	0	0
Bloomfield	2,227	0	0
Harris	2,225	0	0
Pizzey	2,177	0	0
Keeble	2,072	0	0
M'Kenzie	2,070	0	0
Peill & Son	1,950	0	0
Wainwright	1,950	0	0
Jackson	1,949	0	0
Richardson (accepted)	1,748	0	0

For pulling down and rebuilding No. 52, Castle-street, Long-acre, for Messrs. Combe & Co. Mr. Henry R. Cotton, architect:—

Patrick	£2,074	0	0
Williams & Son	1,965	0	0
Eaton	1,875	0	0
Toms	1,766	0	0

For the extension of the Wesleyan Chapel and erection of new organ-chamber, class-room, &c., at Ratcliffe-on-Trent. Mr. S. Dutton Walker, architect:—

Vickerstaff & Hickling	£400	0	0

For the erection of a pair of villas, Knight's Hill-road, Lower Norwood, Surrey. Mr. Frederick C. Notley, architect:—

R. & E. Smith	£3,144	0	0
Candler	3,000	0	0
Buckland	2,996	0	0
Hayworth	2,983	0	0
Thompson	2,920	0	0
Tarrant & Sons (accepted)	2,888	0	0

For the erection of a detached villa at Knight's Hill-road, Lower Norwood, Surrey. Mr. Frederick C. Notley, architect:—

R. & E. Smith	£2,084	0	0
Buckland	1,997	0	0
Tarrant & Sons	1,990	0	0
Hayworth	1,989	0	0
Thompson	1,980	0	0
Candler	1,900	0	0

For new laundry building, exclusive of fittings, for the Staines Union. Mr. George Judge, architect. Quantities supplied by Mr. W. H. Brayshaw:—

Boyce	£1,294	0	0

For the rebuilding of No. 72, Bishopsgate-street Without, for Messrs. Thomas & Sons. Mr. Charles Bell, architect. Quantities by Mr. Henry Lovegrove:—

Chessum	£6,214	0	0
Scrivener & Co.	6,175	0	0
Browne & Robinson	6,105	0	0
Downs	6,075	0	0
Tarrant & Sons	5,970	0	0
Stimpson & Co.	5,833	0	0
Pritchard & Son	5,823	0	0
Nightingale	5,753	0	0
Ashby, Brothers	5,730	0	0
Woodward	5,534	0	0

For alterations and additions to No. 113, Church-street, Chelsea. Mr. A. E. Hubert, architect:—

Chappell	£385	0	0
Somerville & Hill	362	0	0
Wright (accepted)	353	10	0

For the erection of farm buildings, chapel, boundary-walls, and lodge to new Lunatic Asylum, Portsmouth. Mr. George Rake, architect. Quantities supplied by Mr. H. P. Foster, and Mr. C. M. Houghton:—

	Farm Buildings.		Chapel.		Boundary Walls & Lodge.	
Burbidge	£3,835	10	£4,785	0	£3,682	10
Roberts	3,810	0	4,747	0	3,645	0
Ward	3,784	0	4,729	0	3,622	0
Cooper	3,961	0	4,255	0	3,127	0
Quick	3,650	0	4,142	0	3,023	0
Prout	3,342	0	4,007	0	2,911	0
Stevens & Bastow	3,434	0	3,999	0	2,820	0
W. & H. Evans	3,202	18	3,965	19	3,017	12
Stiff	3,189	0	3,930	0	2,921	0
Hayter	3,340	0	3,650	0	3,000	0

Stables at Cook's Bridge.—The word "accepted" after Messrs. Musgrave & Co.'s tender was inserted erroneously.

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Erratum.—In recent notice of Mr. Bell's window, in memory of Sir Gilbert Scott, the style is spoken of as "*Pre*-Renaissance"; it should read *Free* Renaissance.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

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